

# Service Manual

Color Television

Main Manual  
(NA6DVD)



**Panasonic**

Model  
**CT-27DC50B**

Chassis  
**AP349**

This Service manual is issued as a service guide for the models of the **NA6DVD** family listed above. Included in this manual are a set of schematic, block diagrams, functional descriptions, alignment procedures, disassembly procedures, and a complete parts list.

**"WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the **"Safety Precautions"** and **"Important Safety Notice"** in this Main Manual.

# Panasonic®

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# Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol  and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent X-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

## Safety Precautions

### General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

**Always Replace Protective Devices**, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

**Extreme care** should be practiced when **Handling the Picture Tube**. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X-ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against X-ray radiation as well as implosion. The magnetic shield limits the X-ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling **40kV** without causing X-ray radiation.

**Before returning a serviced receiver to the owner**, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

### Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed

metallic part has a return path to the chassis, the reading should be between 240k $\Omega$  and 5.2M $\Omega$ . If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

### Leakage Current Hot Check (Fig. 1)

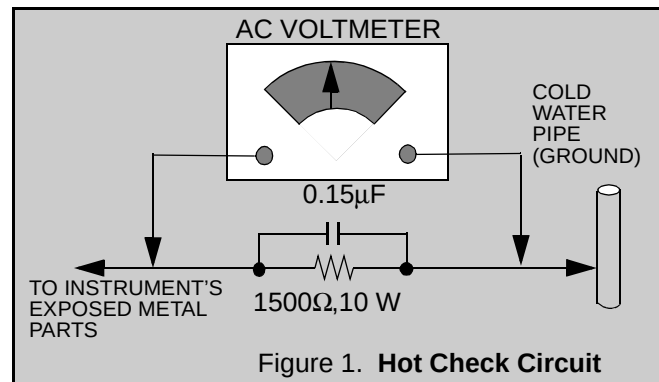
Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5k $\Omega$  10 watt resistor in parallel with a 0.15 $\mu$ F capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 1/2 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.



### X-ray Radiation

**WARNING:** The potential source of X-ray radiation in the TV set is in the High Voltage section and the picture tube.

**Note:** It is important to use an accurate, calibrated high voltage meter.

Set the **brightness, picture, sharpness** and **color** controls to Minimum. Measure the High Voltage. The high voltage should be **29.25kV  $\pm$  1.25kV**. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

### Horizontal Oscillator Disable Circuit Test

This test must be performed as a final check before the Receiver is returned to the customer. See **Horizontal Oscillator Disable Circuit Procedure Check** in this manual.

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# Service Notes

**Note:** These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

## Leadless Chip Component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6k $\Omega$  resistor, 0 = 0 $\Omega$  (jumper). Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

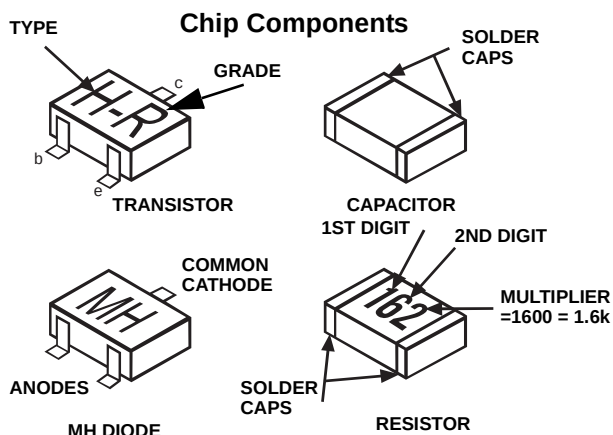
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

## Component Removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

## Chip Component Installation

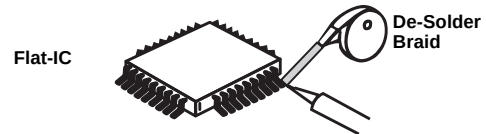
1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.



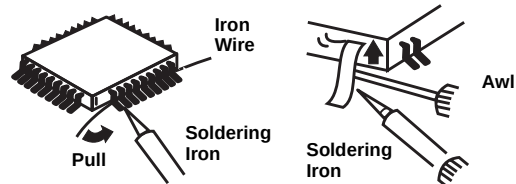
## How to Replace Flat-IC

### - Required Tools -

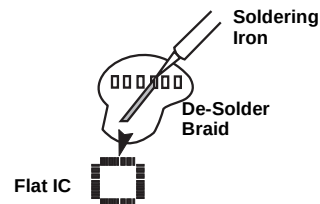
- Soldering iron
  - De-solder braids
  - Iron wire or small awl
  - Magnifier
1. Remove the solder from all of the pins of a Flat-IC by using a de-solder braid.



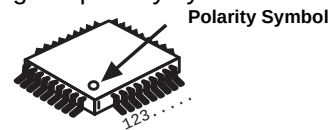
2. Put the iron wire under the pins of the Flat-IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



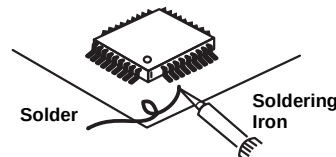
3. Remove the solder from all the pads of the Flat-IC by using a de-solder braid.



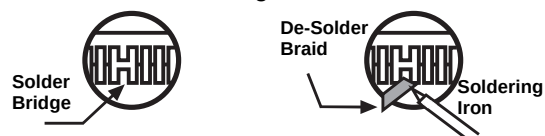
4. Position the new Flat-IC in place (apply the pins of the Flat-IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.



## Service Notes (Continued)

**IMPORTANT:** To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CTR DAG wire are securely connected.

**CAUTION:** The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground (⚡) or (↗) when servicing, or incorrect voltages will be measured.

**WARNING:** This Receiver has been designed to meet or exceed applicable safety and X-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol  on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specification.

### Horizontal Oscillator Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage and beam current. If, for any reason, the high voltage and beam current exceed a predetermined level this protective circuit activates and detunes the horizontal oscillator that limits the high voltage. The over-voltage protection circuit is not adjustable. However, if components indicated by the symbol  on the schematic in either the horizontal sweep system or the over-voltage protection circuit itself are changed, the operation of the circuit should be checked using the following procedure:

Equipment needed to check the disabled circuit:

1. Voltmeter (0 - 200V scale)
2. High Voltage Meter (0- 50kV)
3. Variac or Isolation Transformer

### Procedure:

1. Tune in a station to verify that the horizontal is in sync.
2. Obtain a Monoscope pattern or a signal generator crosshatch pattern
3. Connect the voltmeter (-) lead to TPD2 and the (+) lead to TPD1 (junction of D555 anode, R556 & R557). Set **Bright** level to (0) and **Picture** for a 1.8 volt reading on the voltmeter.
4. Turn the Receiver OFF. Connect a jumper across IC803 pin 3 and pin 4. Apply +9V DC to cathode of D001.
5. Reduce the AC supply voltage to approximately 45V. Connect the high voltage meter to the CRT anode. (H.V. button).

**Note:** Use the Dag Ground (C10 on the CRT Board) to connect the (-) lead of the meter. Turn the Receiver ON. Slowly increase the AC supply voltage and verify that the high voltages does not exceed 37.1kV when horizontal; just begins to pull out of sync. If the high voltage is not within the specified limit, the cause must be determined and corrected before the Receiver is returned to the customer.

## Receiver Feature Table

| FEATURE                 |                |
|-------------------------|----------------|
| Chassis                 | NA6DVD         |
| Tuning system           | 96K            |
| # of channels           | 181            |
| Menu language           | English        |
| Closed Caption          | X              |
| V-Chip                  | X              |
| 75 $\Omega$ input       | X              |
| Remote Model #          | EUR511503      |
| Picture tube            | M68LGL061X     |
| Black Face Regular Tube | X              |
| Comb Filter             | 3 Line Digital |
| H. Edge Correction      | X              |
| V/A Norm - Both         | X              |
| MTS/SAP/DBX             | X              |
| AI Sound                | X              |
| Bass/BI/Tre Control     | X              |

| FEATURE                  |                                            |
|--------------------------|--------------------------------------------|
| Surround                 | X                                          |
| Built-in audio power     | 5Wx2 (10%)                                 |
| # of speakers            | 2                                          |
| A/V in (rear/front)      | 2(2/1)                                     |
| S-VHS Input (rear/front) | 1/0                                        |
| Audio Out (FAO & VAO)    | X                                          |
| Digital Optical Output   | X                                          |
| Headphone Jack           | X                                          |
| Dimensions mm in (WxDxH) | 665.2x536x599.7<br>262x211x236             |
| Weight (kg/lbs)          | 35/77                                      |
| Power source (V/Hz)      | 120/60                                     |
| Anode voltage            | 29.25kV $\pm$ 1.25kV                       |
| Video input jack         | 1V <sub>p-p</sub> 75 $\Omega$ , phono jack |
| Audio input jack         | 500mV RMS 47k $\Omega$                     |

| BOARD | PART NUMBER  | DESCRIPTION                |
|-------|--------------|----------------------------|
| A     | TNPH0353*    | Main Chassis               |
| C     | TNP2AA047AB* | CRT Output                 |
| G     | TNPA1736*    | Video Input (front)        |
| JJ    | TNPA1804*    | A/V Switch and A/V Decoder |
| K     | TNPA1737*    | Customer Controls          |
| M     | TNPA1734*    | DVD-TV CPU Interface       |
| P     | TNPA1738*    | DVD Power Supply           |
| W     | TNPA1735*    | Connector Interface Board  |

\* When ordering, please add an "s" to the part number, for example TNPH0353 should be ordered as TNPH0353S.

Specifications are subject to change without notice or obligation.  
Dimensions and weights are approximate.

## Location of Controls (Receiver)

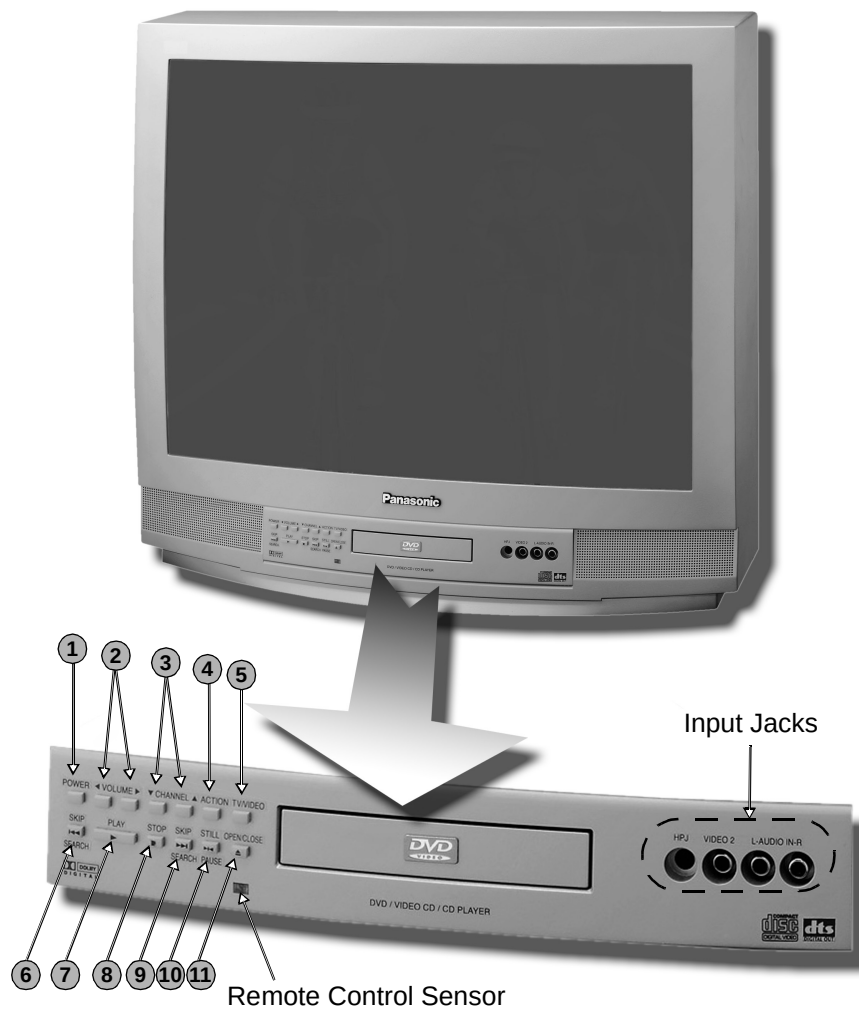


Figure 2. Location of Controls

## Quick Reference Control Operation

| Quick Reference Control Operation |                                                                                                                                                                                                                                                                                       |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ①                                 | <b>Power Button</b> - Press to turn ON or OFF.                                                                                                                                                                                                                                        |
| ②                                 | <b>Volume Buttons</b> - Press to adjust Sound Level, or to adjust Audio Menus, Video Menus, and select operating features when menus are displayed.                                                                                                                                   |
| ③                                 | <b>Channel Buttons</b> - Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select Cable Converter box channels after programming Remote Control Infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position). |
| ④                                 | <b>Action Button</b> - Press to display Main Menu and access On Screen features and Adjustment Menus.                                                                                                                                                                                 |
| ⑤                                 | <b>TV/Video Button</b> - Press to select TV, Video or DVD mode.                                                                                                                                                                                                                       |

## Quick Reference Control Operation

- |   |                                                           |
|---|-----------------------------------------------------------|
| ⑥ | <b>Skip/Search</b> - Press to search all channels/tracks. |
| ⑦ | <b>Play</b> - Play DVD/CD.                                |
| ⑧ | <b>Stop</b> - Stop playing DVD/CD.                        |
| ⑨ | <b>Skip/Search</b> - Skip or search DVD/CD.               |
| ⑩ | <b>Still/Pause</b> - Pause DVD/CD while viewing.          |
| ⑪ | <b>Open/Close</b> - Open or close DVD drawer.             |

# Location of Controls

## REMOTE CONTROL



EUR511503

### POWER

Press to turn ON and OFF.

### LIGHT

Press to light remote control buttons.

### TV DVD CBL/DBS VCR

Press to select remote operation.

### ACTION\*

Press to access menu or enter selections

### VOL

Press to adjust TV sound and navigate in menus.

### CH

Press to select next channel and navigate in menus.

### TV/VIDEO

Press to select TV, Video or DVD mode.

### MUTE

Press to mute sound. Press to access and cancel (CC) Closed Caption.

### R-TUNE

Press to switch to previously viewed channel or video mode.

### RECALL/DISPLAY

Press to display time, channel, sleep timer, and other options. Display On Screen menus in DVD mode.

### "0"~"9"

Press numeric keypad to select any channel. Selects DVD functions in DVD mode.

### SKIP/REW, PLAY, SKIP/FF, CANCEL, TV/VCR, STOP, STILL, PAUSE, REC, SEARCH

Component function buttons.

### IMPORTANT NOTE:

To exit the DVD menu, press the RETURN button.

Figure 3. Location of Controls (Remote).

# Receiver Exploded View

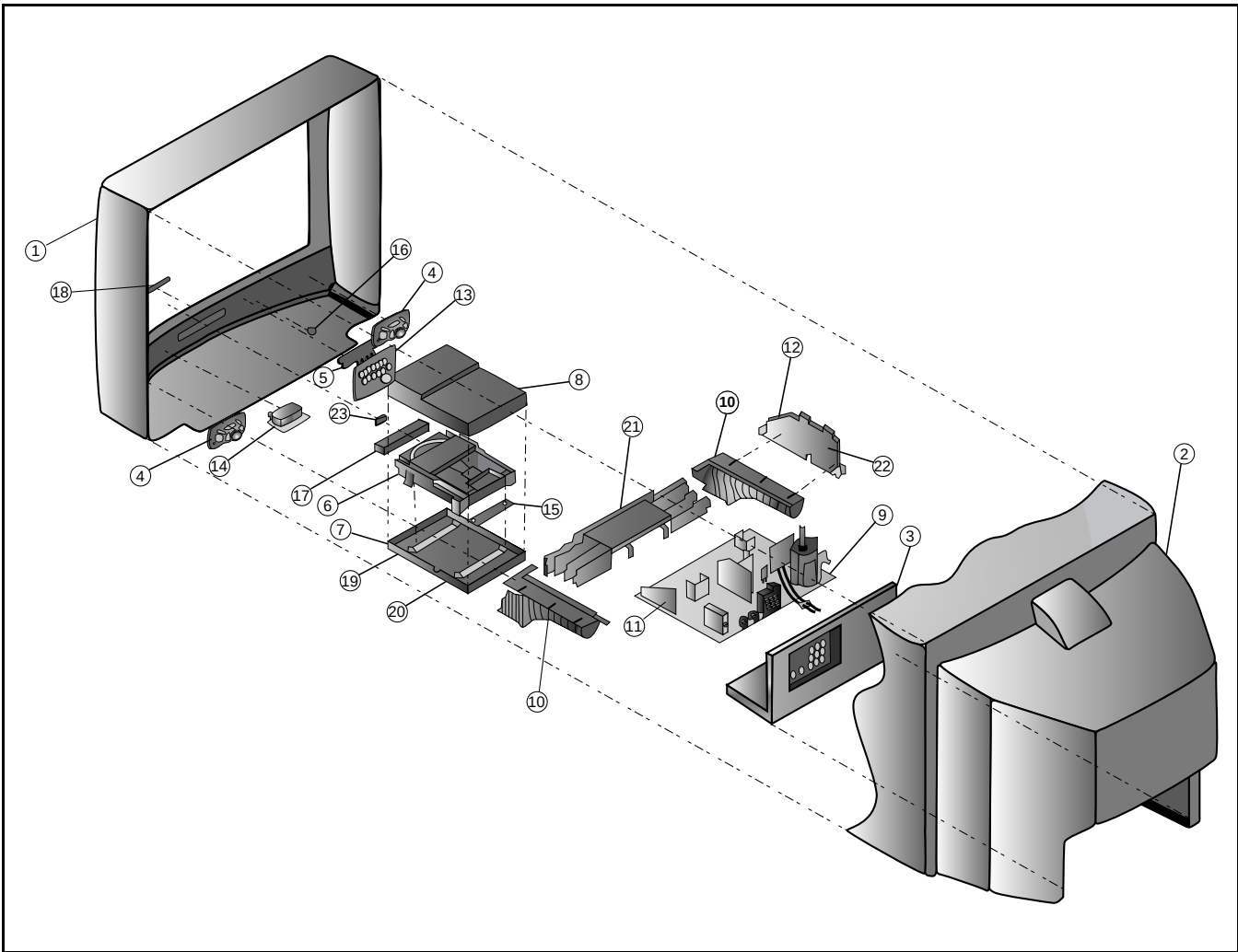


Figure 4. Receiver Exploded View

| LOCATION OF COMPONENTS |                   |   |                      |   |                     |
|------------------------|-------------------|---|----------------------|---|---------------------|
| ①                      | CABINET FRONT     | ⑨ | A-BOARD              | ⑰ | TRAY PANEL          |
| ②                      | BACK COVER        | ⑩ | CHASSIS RAIL (L & R) | ⑱ | PANASONIC BADGE     |
| ③                      | A-V REAR BRACKET  | ⑪ | M-BOARD              | ⑲ | MOUNT METAL FRONT   |
| ④                      | SPEAKER           | ⑫ | P-BOARD              | ⑳ | MOUNT METAL REAR    |
| ⑤                      | BUTTONS           | ⑬ | K-BOARD              | ㉑ | DVD BRACKET         |
| ⑥                      | DVD UNIT          | ⑭ | G-BOARD              | ㉒ | P-PANEL MOUNT METAL |
| ⑦                      | BOTTOM CASE METAL | ⑮ | W-BOARD              | ㉓ | DVD LOGO BADGE      |
| ⑧                      | TOP CASE METAL    | ⑯ | IR GUIDE             |   |                     |

# Disassembly for Service

## Back Cover

Remove all the screws marked with an arrow(←) from the back of the Receiver.

- 3 screws at the top edge of the Receiver.
- 1 screw at each lower corner of the Receiver.
- 1 screw by the A/V jacks.
- 1 screw by the AC cable opening cover.
- 1 screw closest to the antenna terminal.
- 1 screw by the Fly-back assembly.

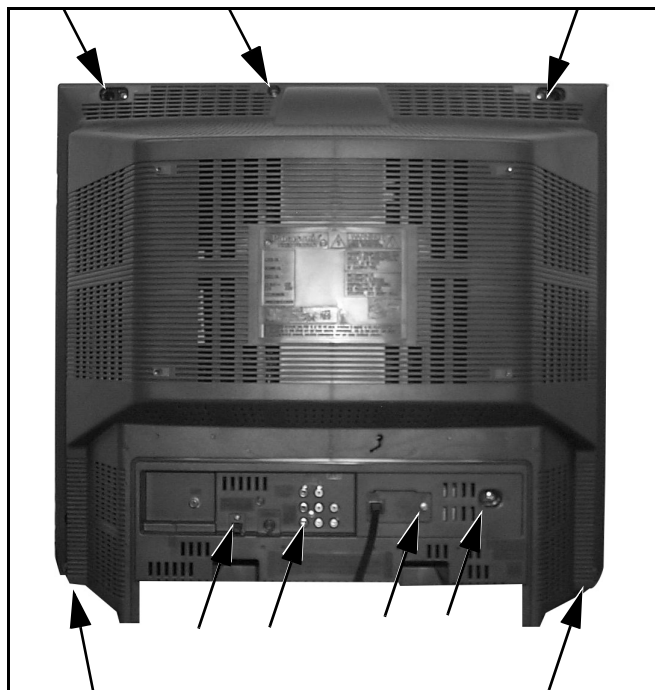


Figure 5. Back Cover Screw Location

## A-Board - Main Chassis

The board is secured in place by the guide rails and by the DVD bracket. See Fig. 14 on page 14.

1. The A-board is mounted in guides (rails) which are attached to the DVD bracket and lock to the cabinet. To remove the rails, DVD bracket and A-Board press on the release tabs located at the bottom of the cabinet, behind the rails and pull forward.
2. Release cable connectors leading to the A-Board and also from clampers.
3. Press on the tabs located at the front end of the A-Board and slide the board forward.

**Note:** Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.

**IMPORTANT NOTE:**  
Reuse hardware (screws, bolts, connectors, etc.) upon reassembling the Receiver.

## C-Board - CRT Output

Socket plugs onto the CRT neck.

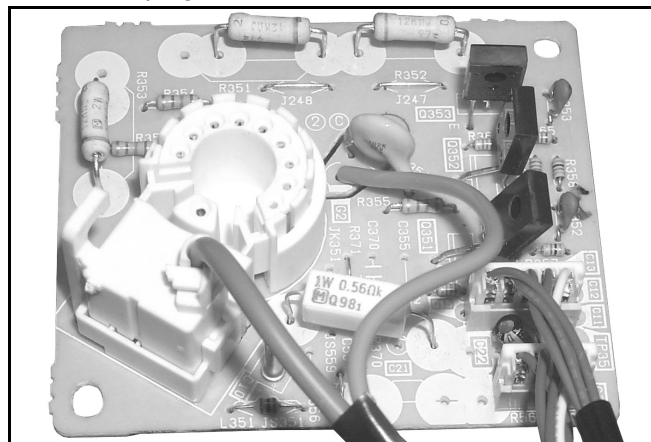


Figure 6. C-Board Assembly

## G-Board - Video Input (Front)

Fastened to the front panel. Position bottom of board on back of front panel and secure with 1 screw.

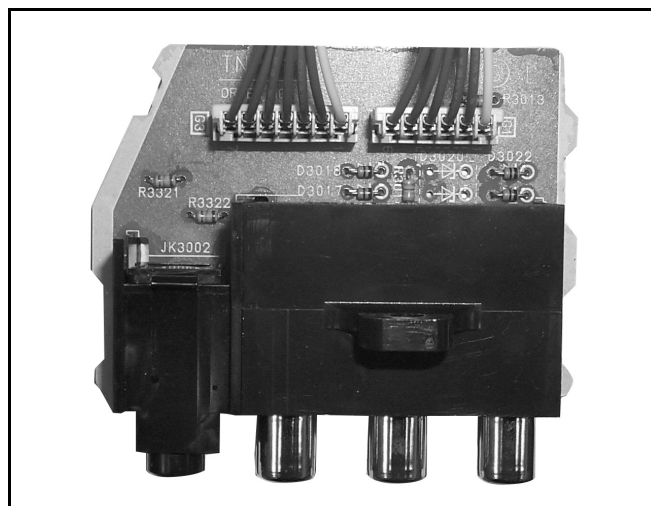


Figure 7. G-Board Assembly

## JJ-Board - A/V Switch, A/V Decoder

Plugs perpendicularly into 4 connectors on the A-Board.

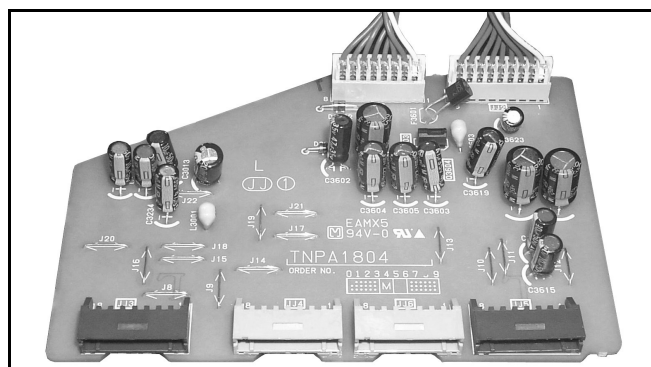


Figure 8. JJ-Board Assembly

## K-Board - Customer Controls (Keyboard Push Button Assembly)

Fastened to the inside of the cabinet front with 3 screws. The push button unit is attached to the K-Board with 4 snap tabs (spring action). Press on the tabs and pull up to release push button assembly from the K-Board. Install the foam (cushion) between the two rows of push buttons.

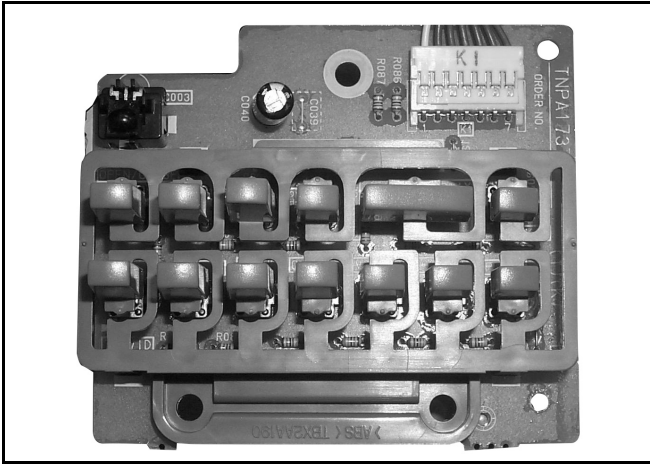


Figure 9. K-Board Assembly

## M-Board - DVD-TV CPU Interface

Plugs perpendicularly into 3 connectors on the A-Board.

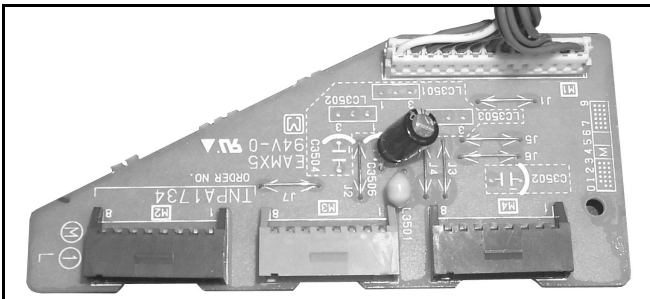


Figure 10. M-Board Assembly

## P-Board - DVD Power Supply

The P-Board is mounted onto the left chassis rail with a metal bracket. The bracket is secured to the rail with 2 screws. The P-Board is secured to the metal bracket with 5 screws.

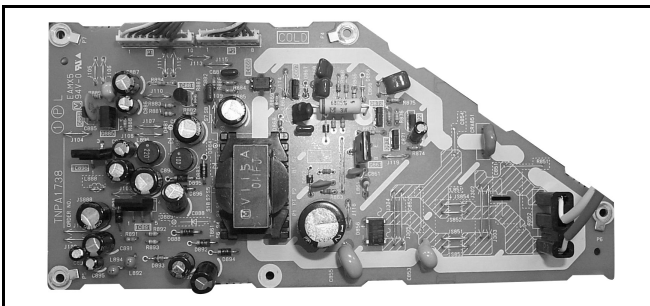


Figure 11. P-Board Assembly

## W-Board - Connector Interface Board

Located underneath the DVD unit. Secured to the DVD enclosure with 2 screws.

## Speakers

Speakers are secured to the cabinet's front with 4 screws.

## Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions** (see page 2).
2. Disconnect the yoke (DY) plug, degaussing coil (DEG) plug and the CRT 2nd anode button from the main board.
3. Remove the C-Board from the CRT base and unplug the black wire (CRT dag ground) C10.
4. Disconnect the A11, A12, and Speakers plugs from the A-Board.
5. Lift the Main Chassis (A-Board) and all mounted boards completely out with the CRT Board attached.

## CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. Anode button is discharged before handling the CRT. Read the **Safety Precautions** (see page 2) on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order for the CRT mounting hardware as they are remove from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.

### To remove and re-mount the degaussing coil:

The degaussing coil is held in place by clampers fastened to the CRT corner ears. These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil.

### To remove and re-mount the dag ground braid:

- a. Unhook the coil spring from the bottom corners of the CRT ears.
  - b. Release the braid loop from the upper corners of the CRT ears.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as was on the original CRT.
  8. Replace the components on CRT neck and reinstall into cabinet. Verify that all ground wires and circuit board plugs get connected.

**IMPORTANT NOTE:**  
Reuse hardware (screws, bolts, connectors, etc.) upon reassembling the Receiver.

## DVD Replacement

**Note:** *Observe universal **STATIC PRECAUTIONS** when handling the DVD unit.*

Replace the DVD unit when it fails (DVD unit is not shipped with the enclosure). When installing a new DVD, note the order of disassembly, and save the hardware.

Follow the procedures for A-Board Removal on page 11. It is necessary to disassemble the plastic frame that holds the A-Board. It is held by 2 snap tabs on each side - one at the back side of the A-Board frame, and one approximately 1.5" apart (inside the plastic stiffening rib). Gently pull on the tabs to release each rail from the DVD bracket. See items 10 and 21 on page 10. Then, remove the W-Board located underneath the DVD which is secured to the DVD case with 2 screws. Reinstall in reverse order of disassembling. Reuse hardware and flat cable. See Fig. 14 in page 14.

**Remove the shipping grounding "plug" from the underside of the DVD unit.**

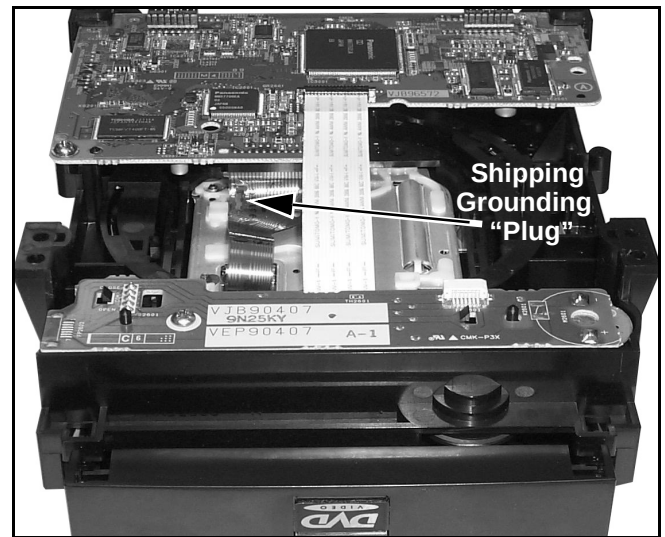


Figure 13. DVD Unit Shipping Grounding "Plug" Removal

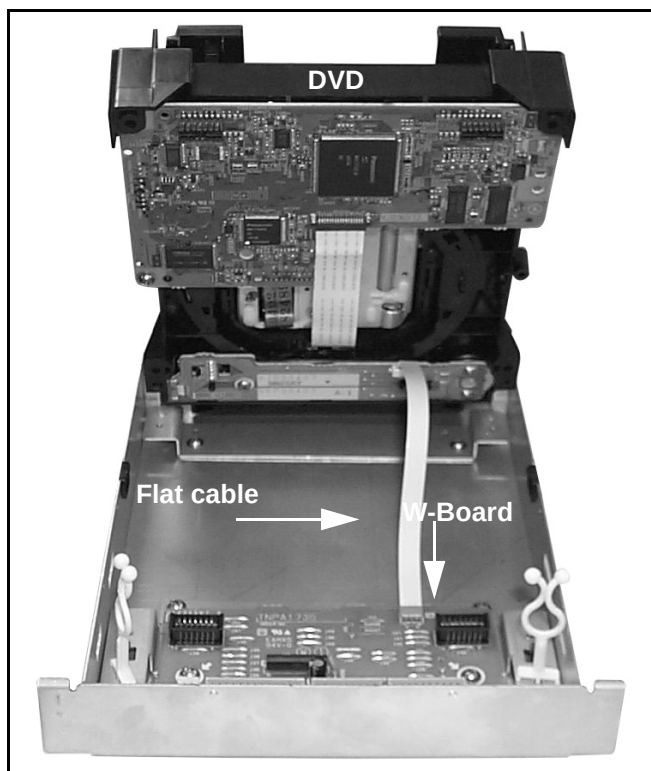
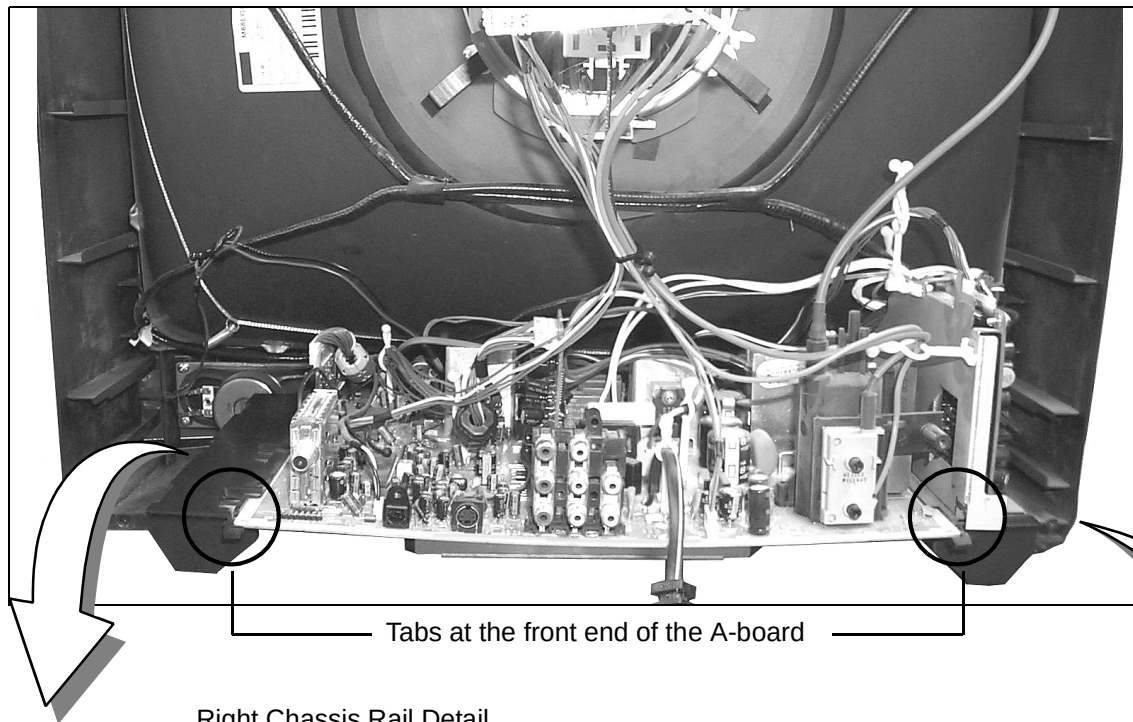


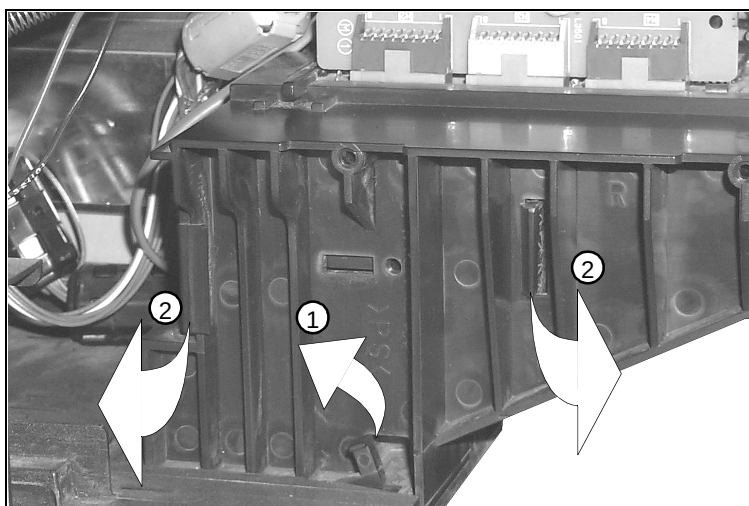
Figure 12. DVD Unit Connection

**IMPORTANT NOTE:**  
Reuse hardware (screws, bolts, connectors, etc.) upon reassembling the Receiver.

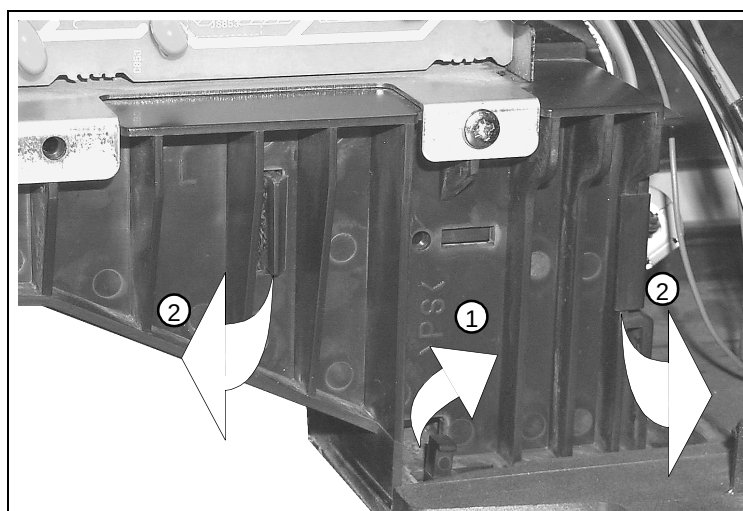
**Note:** *Verify that the ferrite beads are installed on the cables connecting to the DVD unit. See Fig. 12, Fig. 13 & Fig. 16 (page 16).*



Right Chassis Rail Detail



Left Chassis Rail Detail



- ① To remove the rails, the DVD bracket and the A-Board press on the release tabs, and pull forward.
- ② To release each chassis rail from the DVD bracket, pull on the tabs

Figure 14. A-Board and DVD unit Disassembly

## Disassembly for Service (Continued)

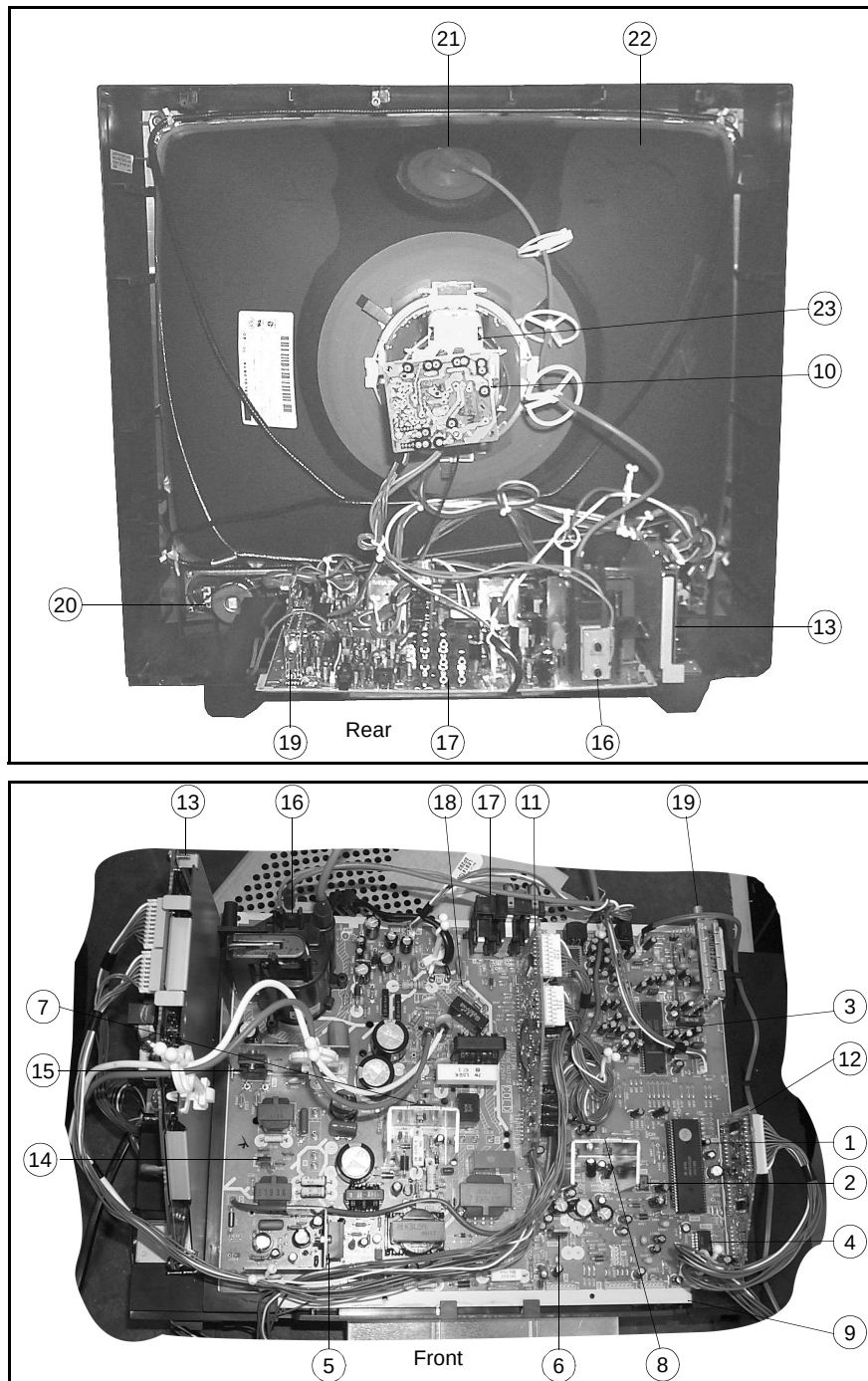


Figure 15. Receiver Internal View

| LOCATION OF COMPONENTS |                   |        |          |             |                 |         |                |
|------------------------|-------------------|--------|----------|-------------|-----------------|---------|----------------|
| INTEGRATED CIRCUITS    |                   | BOARDS |          | TRANSISTORS |                 | VARIOUS |                |
| ①                      | IC 001 MPU        | ⑨      | A BOARD  | ⑭           | Q501 HOR.       | ⑯       | T551 (FLYBACK) |
| ②                      | IC 002 EEPROM     | ⑩      | C BOARD  | ⑮           | Q551 HOR.       | ⑰       | A/V JACKS      |
| ③                      | IC 101 VCJ        | ⑪      | JJ BOARD |             |                 | ⑱       | FUSE (F801)    |
| ④                      | IC 6501 3L FILTER | ⑫      | M BOARD  |             |                 | ⑲       | TUNER          |
| ⑤                      | IC 451 VERTICAL.  | ⑬      | P BOARD  |             |                 | ⑳       | SPEAKER        |
| ⑥                      | IC 552 REG.       |        |          |             |                 | ㉑       | ANODE          |
| ⑦                      | IC 803 REG.       |        |          | ㉒           | CRT             |         |                |
| ⑧                      | IC 2302 AUDIO OUT |        |          | ㉓           | DEFLECTION YOKE |         |                |

## Disassembly for Service (Continued)

### G-Board Installation

Verify that when the cables leading from the A-Board to the G-Board are replaced, the ferrite beads are installed. See Fig. 16.

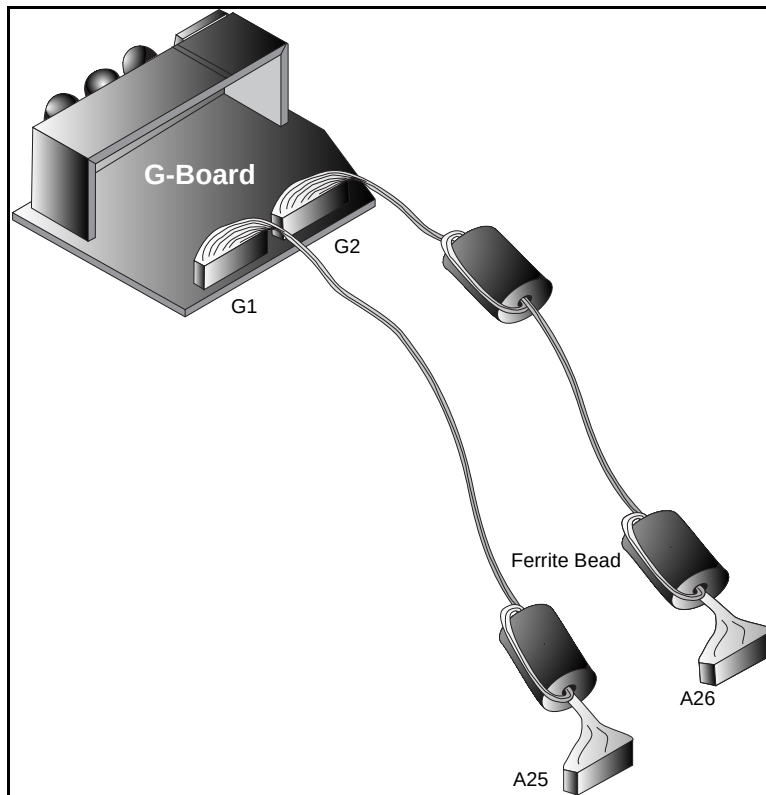


Figure 16. G-Board Cables & Ferrite Beads Assembly

**IMPORTANT NOTE:**  
Reuse hardware (screws, bolts, connectors, etc.) upon reassembling the Receiver.

# Chassis Service Adjustment Procedures

All service adjustments are factory preset and should not require adjustment unless controls and/or associated components are replaced.

**Note:** Connect the (-) lead of the voltmeter to the appropriate ground. Use IC803's heat sink when the HOT ground symbol (+) is used. Otherwise, use COLD ground (+) — Tuner shield, IC451's heat sink or FA2.

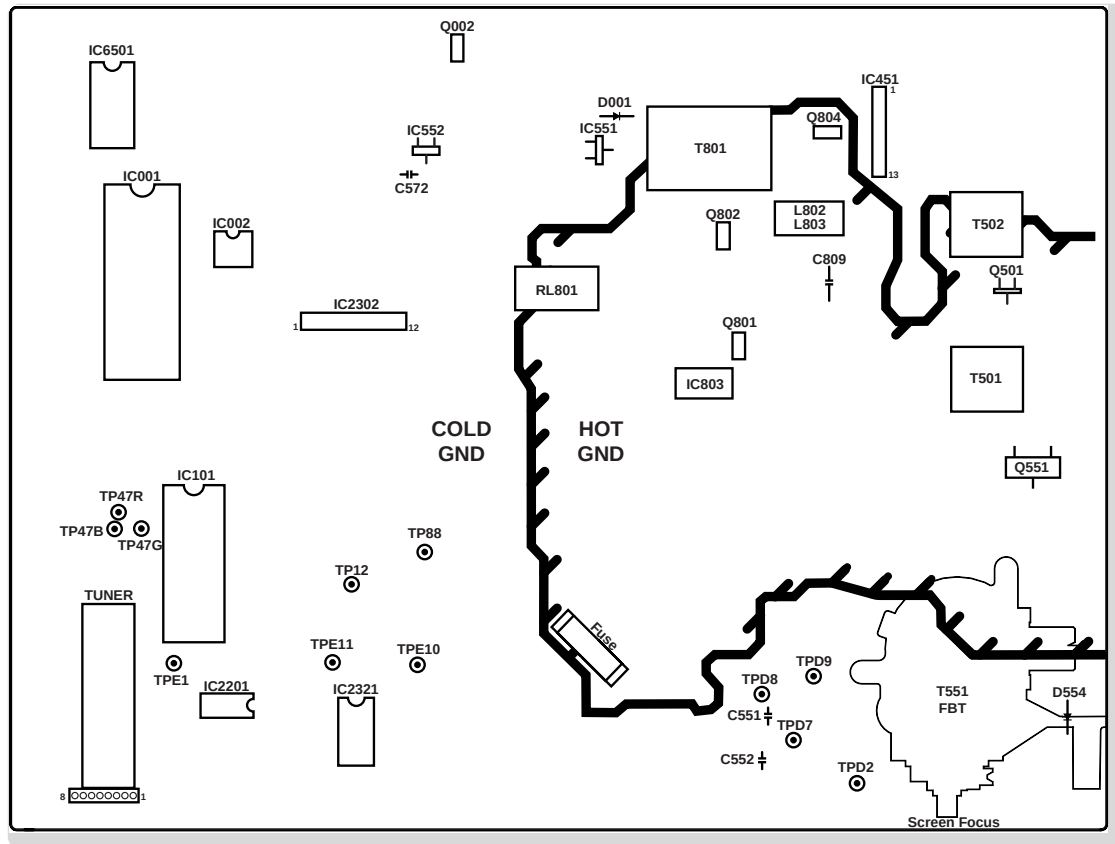


Figure 17. A-Board Main Components and Test Points

MOMENTARILY CONNECT A JUMPER FOR ENTERING SERVICE MODE (FA1 to FA2 )

## 131.0V B+ Voltage Confirmation

1. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu.
2. Connect the DVM between C809(+ side) and cold ground (+).
3. Confirm that B+ voltage is **131.0V ± 2.5V**. This voltage supplies B+ to the Horizontal Output & Flyback circuits.

## Source Voltage Chart

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu. Use cold ground (+) for the (-) lead of the DVM.

| LOCATION      | VOLTAGE      |
|---------------|--------------|
| TPD8          | 27.4V ± 2V   |
| TPD9          | 13.0V ± 2V   |
| C552 (+) side | 8.0V ± 1V    |
| IC551 Pin3    | 9.0V ± 0.5V  |
| D554 Cathode  | 220V ± 15V   |
| C572 (+) side | 5.0V ± 0.25V |

Adjust Picture Menu for normalized video adjustments.

## High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears.
3. Confirm B+ 131V is within limit.
4. Using a high voltage meter confirm that the High Voltage at the CRT anode is **29.25kV ± 1.25kV**.

## DVD Voltage Check

Play a DVD TEST DISC and measure the following:

| LOCATION                    | VOLTAGE       |
|-----------------------------|---------------|
| JJ1 pin1 - P2 pin1 (TPJJ5)  | -11.0V ± 1V   |
| JJ1 pin3 - P2 pin3 (TPJJ10) | 11.0V ± 1V    |
| JJ1 pin5 - P2 pin5 (TPJJ6)  | 5.0V ± 0.25V  |
| JJ1 pin6 - P2 pin6 (TPJJ7)  | 5.0V ± 0.25V  |
| W6 pin2 - P1 pin7 (TPW7)    | 2.5V ± 0.125V |
| W6 pin4 - P1 pin4 (TPW6)    | 2.5V ± 0.125V |
| W6 pin6 - P1 pin6 (TPW5)    | 5.0V ± 0.25V  |
| W6 pin8 - P1 pin8 (TPW3)    | 9.0V ± 0.45V  |
| W6 pin10 - P1 pin10 (TPW4)  | 5.0V ± 0.25V  |

# Purity and Convergence Procedure

Adjustment is necessary only if the CRT or the deflection yoke is replaced or if the setting was disturbed. The complete procedure consists of:

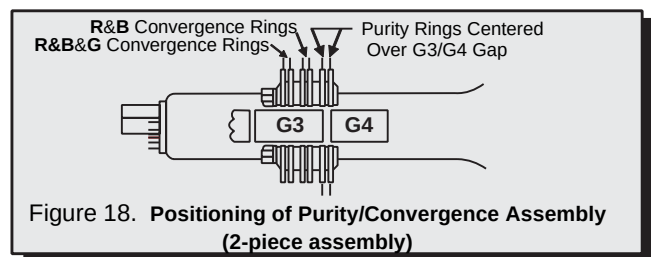
1. Vertical Raster Shift Adjustment. (**Only for Models with Purity/Convergence Assembly with 4 Pairs of Rings**).
2. Initial static convergence.
3. Setting the purity.
4. Final static convergence.

## When the CRT or the Yoke is Replaced

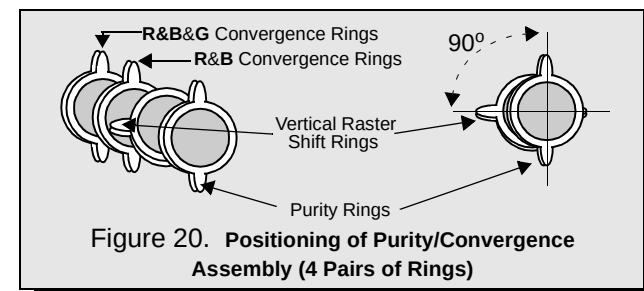
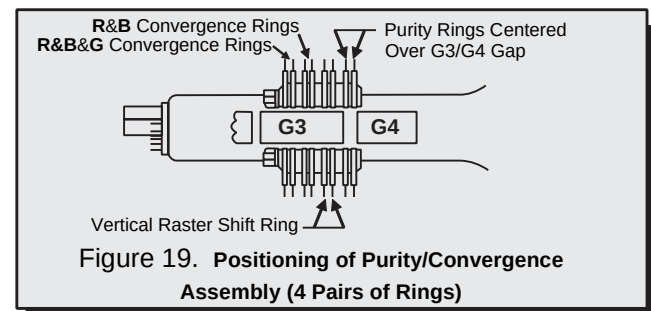
Place the yoke on the CRT neck (do not tighten the clamp).

### For a 2-piece assembly (see Fig. 18):

Position purity/convergence assembly as shown and tighten clamp snugly. Remove the hot-melt glue seal on assembly and position like tabs of purity device together at 12 o'clock to reduce its magnetic field effect.

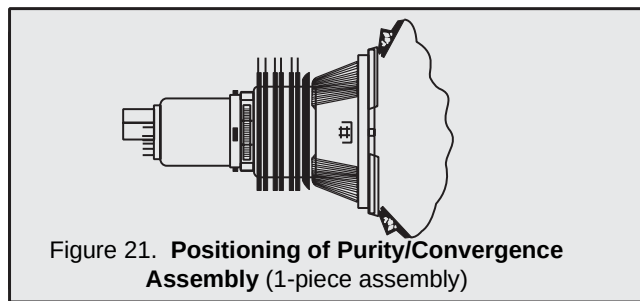


For models using 4 pairs of rings, place the vertical raster shift tabs at 3 o'clock (90° from the purity and convergence tabs, see Fig. 19 and Fig. 20)



### For a 1-piece assembly (see Fig. 21):

Position like tabs of purity devices together at 12 o'clock to reduce any magnetic field effect. (For better results, note part number and look for specifications at Service Center)



### For either assemblies:

Turn the Receiver ON. Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT.

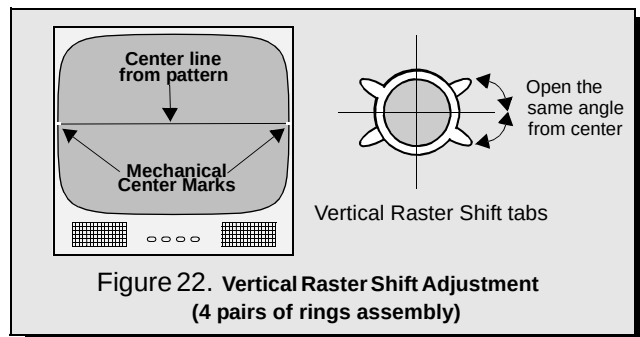
Fully degauss the Receiver by using an external degaussing coil.

Slide the deflection yoke back and forth on the neck of the CRT until it produces a near white, uniform raster.

## Vertical Raster Shift Adjustment (Only for Models with Purity/Convergence Assembly with 4 Pairs of Rings).

Apply a green pattern with a horizontal line, adjust the Deflection Yoke so that has no tilt, then secure it.

Adjust center line of the pattern with the mechanical center of the CRT, this center is determined by two marks at the side edges of the screen. To adjust the line, once the vertical raster shift tabs are placed at 3 o'clock to reduce its magnetic field effect (see Fig. 19 and Fig. 20) open the tabs the same angle from the center, until the center line of the pattern becomes a straight line, centered with the marks of the CRT. (see Fig. 22)



## Initial Center Static Convergence

Connect a dot/cross hatch generator to the Receiver and tune in a signal. Observe misconvergence at center of the screen only.

Adjust the R&B pole magnets; by separating tabs and rotating to converge blue with red.

Adjust the R&B and R&B&G pole magnets: by separating tabs and rotating to converge blue and red (magenta) with green.

**Note:** *Precise convergence at this point is not important.*

## Purity Adjustment

When the Receiver is in the Serviceman Mode for making electronic adjustments, press the **Recall** button on the Remote Control to enter Purity Check. (See the **Service Adjustments Electronic Controls** procedure).

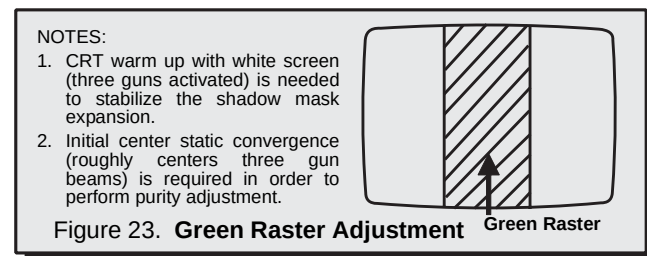
Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT. Fully degauss the Receiver by using an external degaussing coil.

Press the **Recall** button on the Remote Control again until the Purity Check (green screen) appears.

**For a 2-piece assembly** (see Fig. 18):

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the Purity rings to set the vertical green raster precisely at the center of the screen (see Fig. 23).



Slowly move the deflection yoke forward until the best overall green screen is displayed.

**For a 1-piece assembly** (see Fig. 21):

## Permalloy Convergence Corrector Strip (Part No. 0FMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

Slowly move the deflection yoke and purity rings assembly toward the CRT board and adjust the purity magnet rings to set vertical green raster at center of screen (see Fig. 23).

Gradually move the deflection yoke & purity rings forward and adjust for best overall green screen.

**Continue from here for either assemblies:**

Tighten the deflection yoke clamp screw.

Press the **Recall** button on the Remote Control again until the purity check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.

Press the **Recall** button on the Remote Control again until Purity check (white screen) appears. Observe the screen for uniform white. If purity has not been achieved, repeat the above procedure.

**Final Convergence Procedure** (see Fig. 24 through Fig. 26):

**Note:** *Vertical size and focus adjustments must be completed prior to performing the convergence adjustment. Connect a dot pattern generator to the Receiver. The **Brightness** level should not be higher than necessary to obtain a clear pattern.*

Converge the red and the blue dots at the center of the screen by rotating the R&B pole Static Convergence Magnets.

Align The converged red/blue dots with the green dots at the center of the screen by rotating the R&B&G pole Static Convergence Magnets. Melt wax with soldering iron to reseat the magnets.

Slightly tilt vertically and horizontally (do not rotate) the deflection yoke to obtain a good overall convergence.

If convergence is not reached at the edges, insert permalloy (see following section) from the DY corners to achieve proper convergence. Recheck for purity and readjust if necessary.

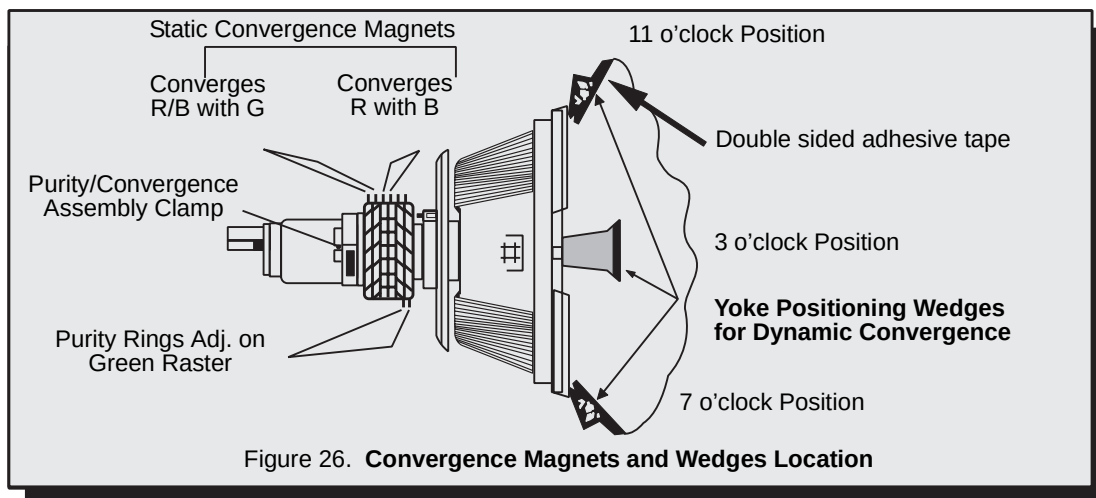
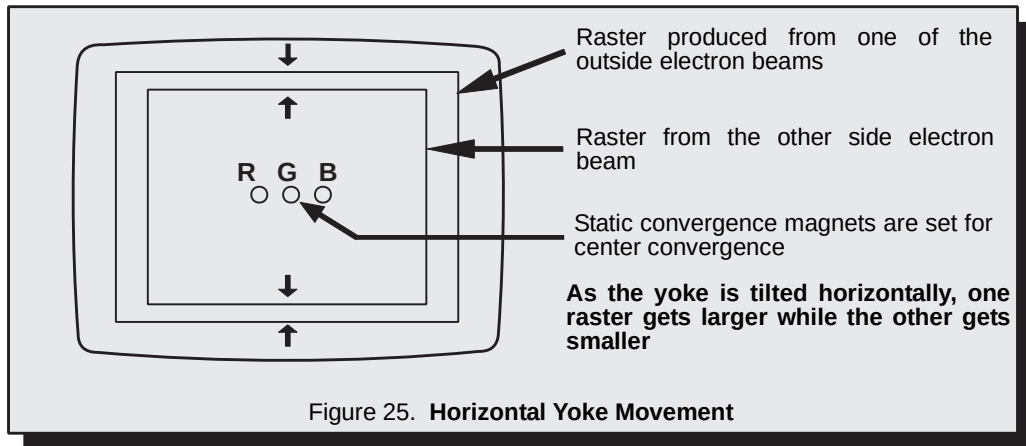
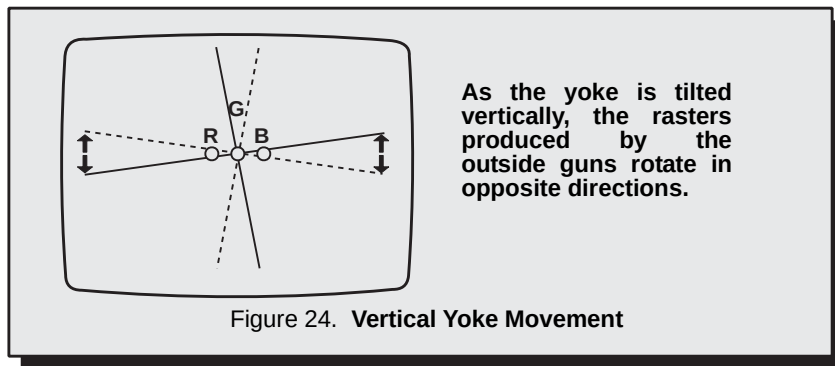
After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.

Secure the deflection yoke by inserting two side wedges at 3 and 7 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over the tab to secure to the CRT.

If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.



**Note:** For models using 4 pairs of rings assemblies see Fig. 19 for details

# Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I<sup>2</sup>C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using "On Screen Display Menu". (The **Serviceman Adjustment Mode**.)

**Note:** It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the **Serviceman Adjustment Mode**; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.

## Quick Entry to Serviceman Mode:

At times when minor adjustments need to be done to the electronic controls, the method of Entering the serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press ACTION button twice to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press the VOL ◀ button (decrease) on Receiver. Red "CHK" appears in upper corner.

## To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing the Action and the Volume Up buttons on the Receiver simultaneously will toggle between the modes. Red "CHK" for Serviceman and yellow "CHK" for Aging.

7. Press the **Power** Button on the **Remote Control** to select one of six Serviceman Adjustment Modes.
  - 1) **B**= Serviceman VCJ SUB-DATA ADJUSTMENT.
  - 2) **C**= Serviceman VCJ CUT-OFF ADJUSTMENT.
  - 3) **S**= Serviceman OPTIONS (PIP and CLOCK) ADJUSTMENT.
  - 4) **M**= Serviceman MTS ADJUSTMENTS.
  - 5) **X** = Serviceman COMB FILTER ADJUSTMENT.
  - 6) **"CHK"** = Normal operation of CHANNEL ▲▼ and VOLUME ◀▶.

**Note:** Only the applicable settings for the Receiver serviced will be available (See a in Fig. 27).

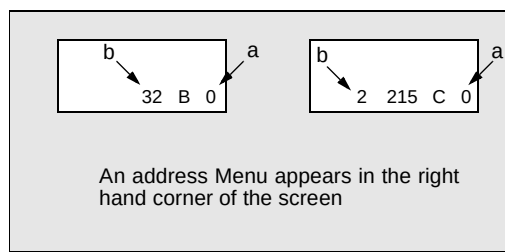


Figure 27. Serviceman Mode Menu Adjustments.

## Exiting the Serviceman Mode:

Press the **Action** and the **Power** buttons on the **Receiver** simultaneously for at least 2 seconds.

### THE RECEIVER EXITS SERVICEMAN MODE.

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound. Any programmed channels, channels caption data and some others user defined settings will be erased.

**IMPORTANT NOTE:**  
Always Exit the Serviceman Mode  
Following Adjustments.

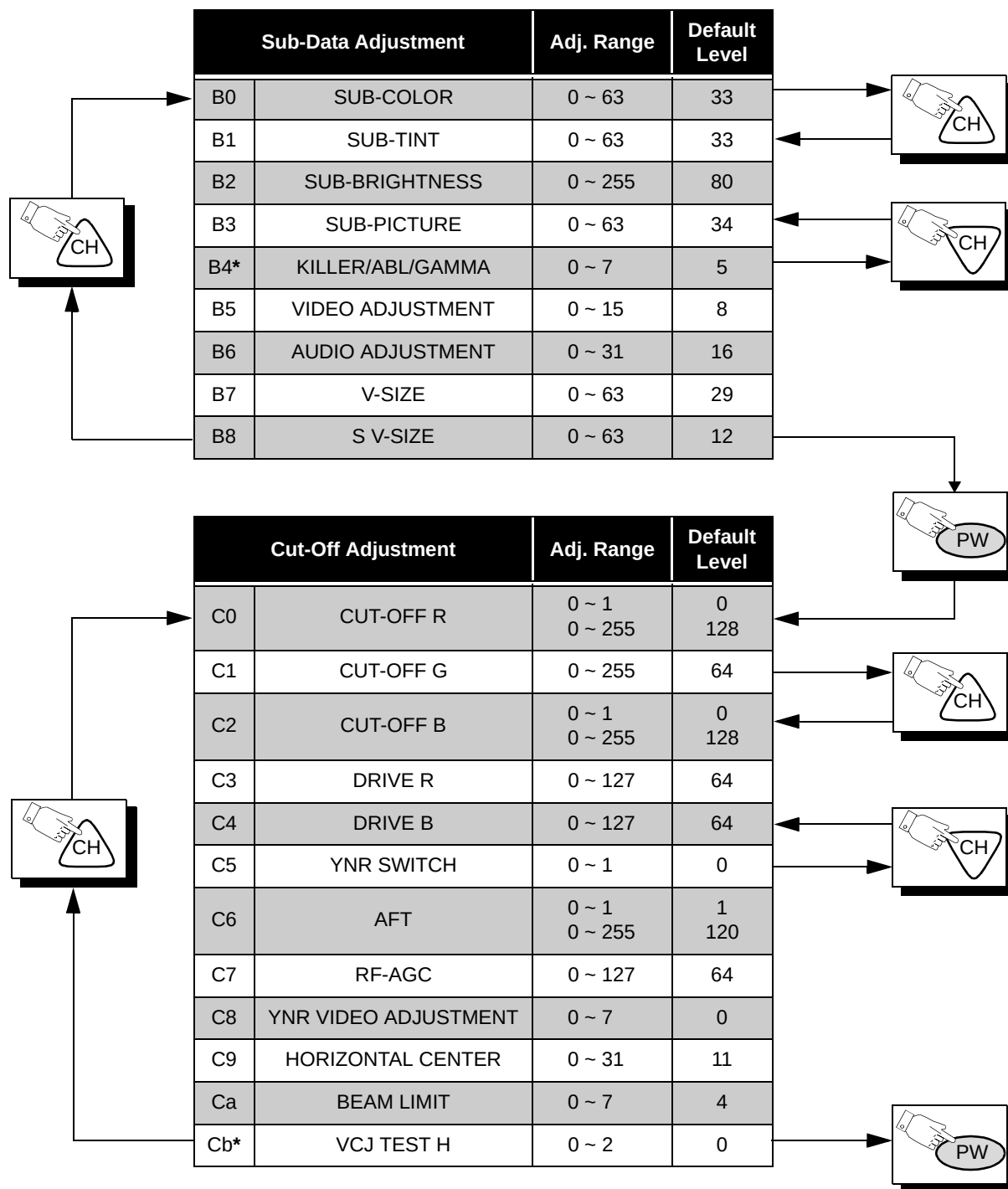
Press the **Power Button** on the **Remote Control** to select the Serviceman Adjustment .

## For Adjustments:

1. Press **Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (a in Fig. 27).

*Note: Write Down the original value set (b in Fig. 27) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. Press **Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (b in Fig. 27).



**IMPORTANT NOTE:**  
Always Exit the Serviceman Mode Following Adjustments.

**\*NOTE**  
This registers are preset at the factory, should not be changed.

To S Items.

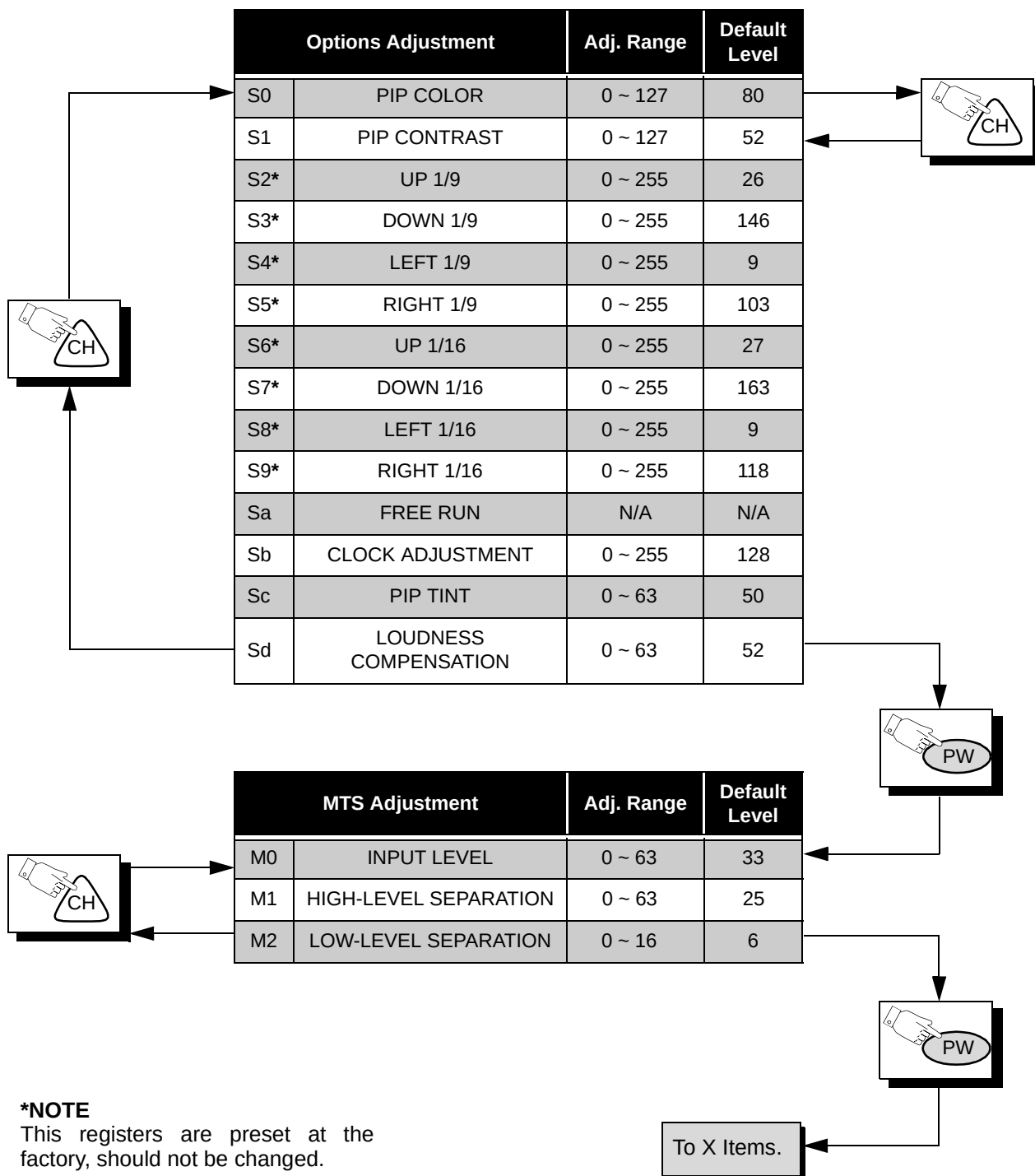
## Press the Power Button on the Remote Control to select the Serviceman Adjustment

### For Adjustments:

1. Press Channel Up/Down on the Remote Control to select one of the available Service Adjustments (a in Fig. 27).

**Note:** Write Down the original value set (b in Fig. 27) for each address before modifying anything. It is easy to erroneously adjust the wrong item.

2. Press Volume Up/Down on the Remote Control to adjust the level of the selected Service Adjustment (b in Fig. 27).



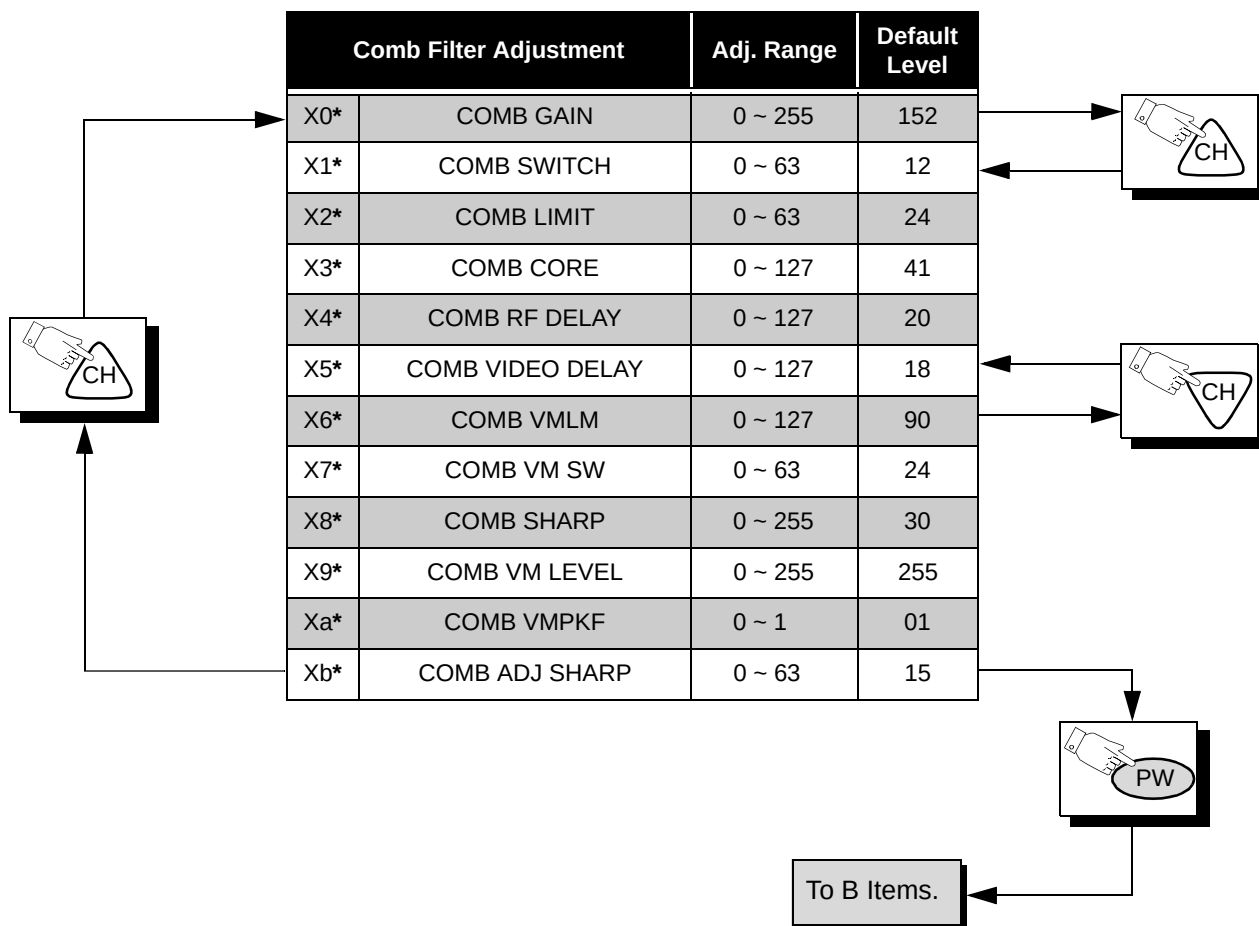
## Press the Power Button on the Remote Control to select the Serviceman Adjustment

### For Adjustments:

1. Press **Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 27).

**Note:** Write Down the original value set (**b** in Fig. 27) for each address before modifying anything. It is easy to erroneously adjust the wrong item.

2. Press **Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 27).

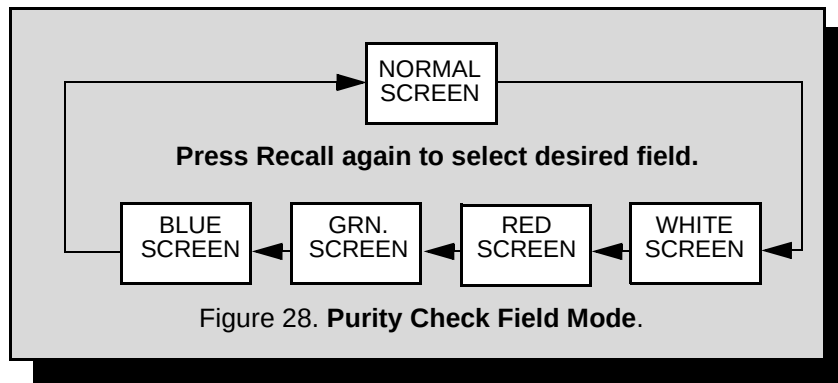


#### \*NOTE

This registers are preset at the factory, should not be changed.

## To Check Purity:

Press the **Recall** Button on the **Remote Control** when in Serviceman Mode (red "CHK" is displayed) to enter the Purity Field Check Mode.



## Helpful Hints

### Entering Serviceman Mode (Back-Open Method)

1. While the Receiver is ON and operating in Normal Mode, momentarily short test point **FA1** (TP8) to Cold Ground (  $\nearrow$  ) **FA2** (TP3) A-Board.

#### ***The Receiver enters the Aging Mode.***

Yellow letters "CHK" appear in the upper left corner of the CRT.

(The Volume Up/Down will adjust rapidly).

2. Simultaneously press the **Action** and the **Volume Up** buttons on the **Receiver** Control Panel.

#### ***The Receiver enters the Serviceman Mode.***

The letter in "CHK" turn red.

(The Volume Up/Down will adjust normally).

(All customer controls are set to nominal level).

**IMPORTANT NOTE:**  
Always Exit the Serviceman  
Mode Following Adjustments.

## Instructional Flow Chart for Serviceman Mode

**IMPORTANT NOTE:**  
Always Exit the Serviceman Mode Following Adjustments.

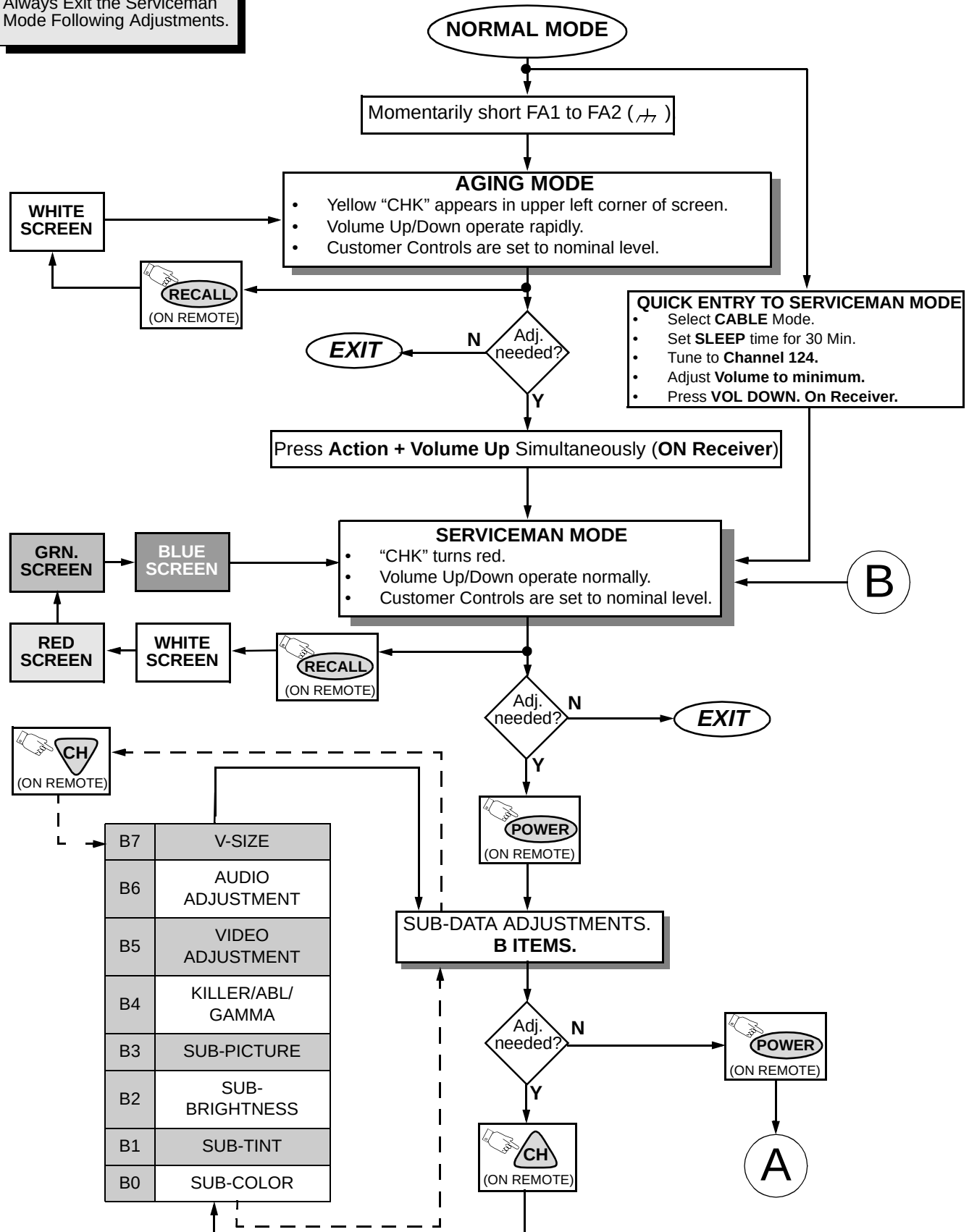


Figure 29. Flow Chart for Serviceman Mode.

## Instructional Flow Chart for Serviceman Mode - Continued

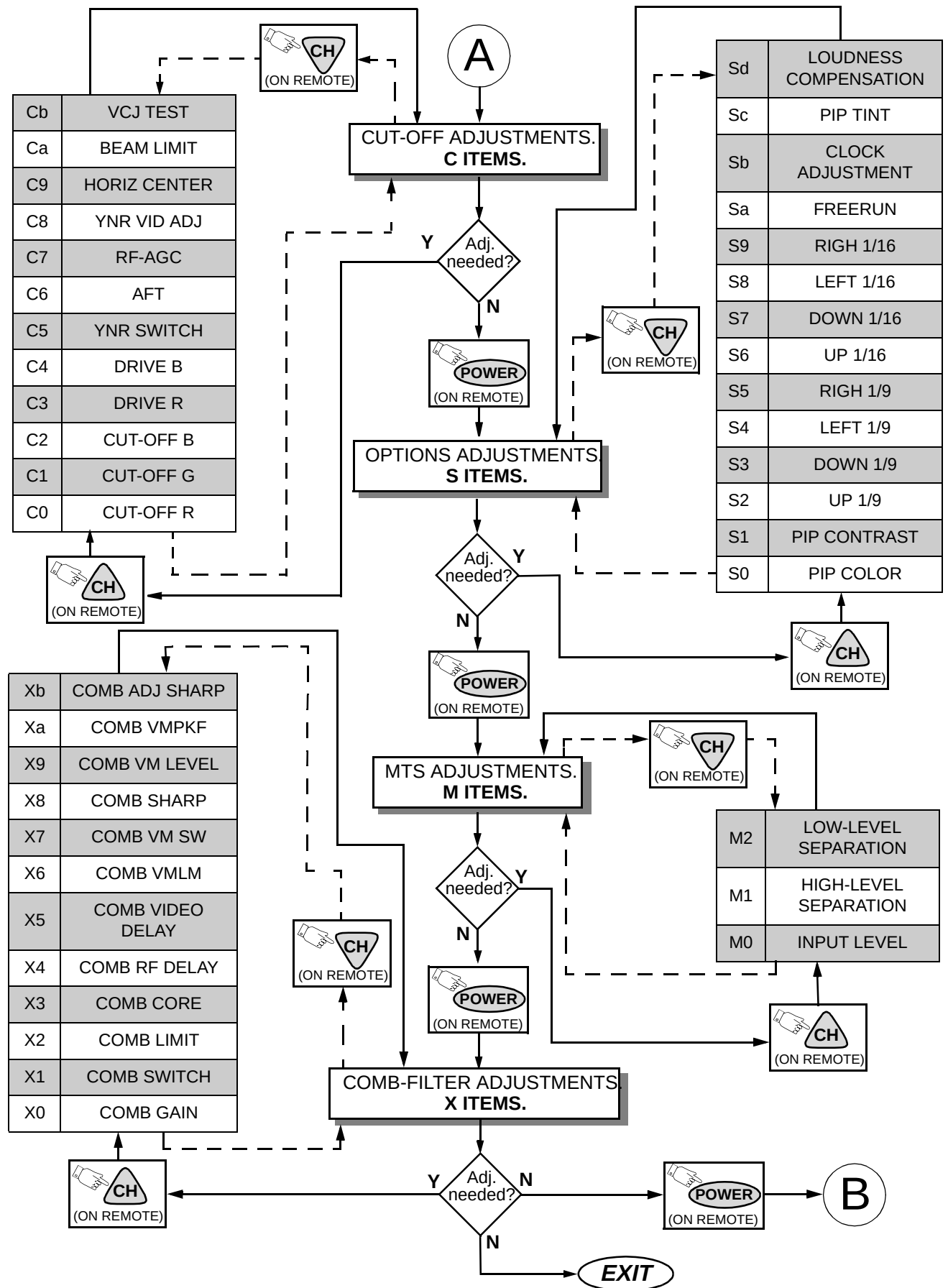


Figure 30. Flow Chart for Serviceman Mode.(Continued)

# Service Adjustments (Electronic Controls)

## Sub-Brightness

### Serviceman DAC Adjustment (B2)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. This adjustment must be made after Sub-Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after the Sub-Brightness is set.

#### Preparation:

Apply a color bar signal with 100 IRE white and 7.5 IRE black. (Switch Color to "OFF" on the signal generator.) Operate the Receiver for a minimum of 10 minutes prior to performing this adjustment.

#### Procedure:

In the Serviceman Mode for making electronic adjustments, select the DAC adjustment (B2) and adjust until the black starts to look gray. Then decrease the level to the point where gray turns to black.

**Note:** You may set the accurate value following the Preparation steps and the Procedure step No. 2 of the Sub-Contrast adjustment described below.

## Video Adjustment Level

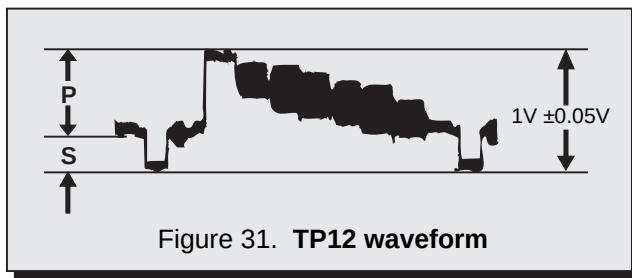
### Serviceman DAC Adjustment (B5)

#### Preparation:

1. Obtain an NTSC color bar pattern with 100 IRE white and 87.5% modulation.
2. Connect the oscilloscope to TP12. Use cold ground for scope connection. Set the scope at Horizontal Sweep rate (20 $\mu$ s) time base.

#### Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Video Adjustment Level (B5) and adjust for **1.0 $\pm$ 0.05V** from sync tip to white level. See Fig. 31.



2. Set the DAC Sub-Contrast Adjustment (B3).

## Sub-Contrast

### Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

#### Preparation:

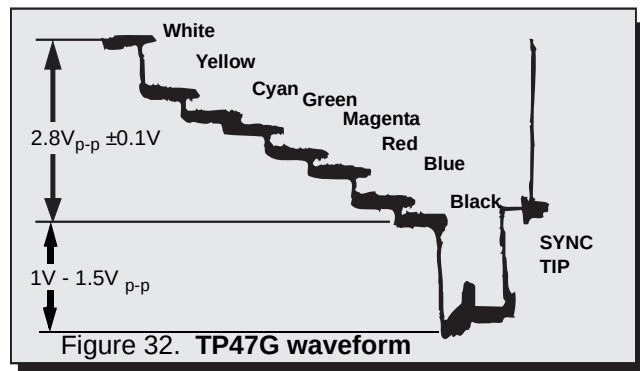
1. Apply a color bar signal pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

**Note:** The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to the pattern used if another signal is used.

2. Preset the following controls:
  - Brightness . . . . . Center.
  - Color . . . . . Min.
  - Picture . . . . . Max.
  - Sharpness . . . . . Center.
3. Connect the oscilloscope to TP47G. Set the scope time base to 20 $\mu$ s (horizontal).
4. Connect a jumper from TPD2 to ground ( $\nearrow$ ).
5. Connect a jumper from IC101 pin 28 to ground ( $\nearrow$ ).

#### Procedure:

1. In the Serviceman Mode, select DAC Sub-Brightness Adjustment (B2) and adjust for **1.0-1.5Vp-p** between blanking and 7.5 IRE level. (See video waveforms detail, Fig. 32).



2. In the Serviceman Mode for electronic adjustments, select DAC Sub-Contrast Adjustment (B3) and adjust for **2.8Vp-p  $\pm$  0.1V** from white level to black level on video waveform (see video waveforms detail, Fig. 32).
3. Remove the jumpers (Preparation steps 4 & 5).

## Tint/Color Adjustment

### Serviceman DAC Adjustment (B1) (B0)

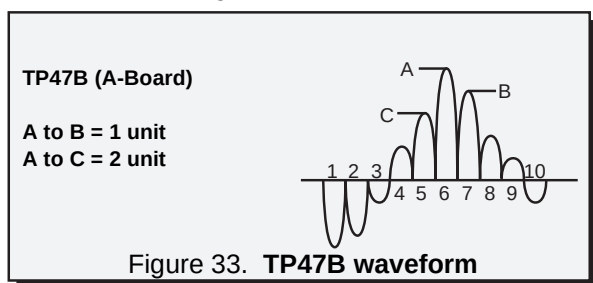
#### Preparation:

1. Apply a rainbow color bar signal.
2. Preset the following controls:
  - Brightness . . . . . Min.
  - Color . . . . . Center.
  - Tint . . . . . Center.
  - Picture . . . . . Max.
  - Sharpness . . . . . Min.
3. Connect the oscilloscope to TP47B (A-Board).
4. Connect a jumper from TPD2 to GND ( $\nearrow$ ).
5. Connect a jumper from IC101 pin 28 to GND ( $\nearrow$ ).

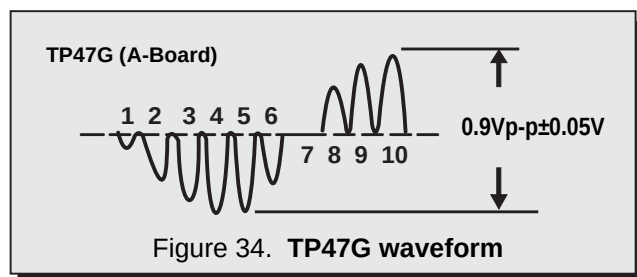
# Service Adjustments (Electronic Controls, cont.)

## Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Sub-Tint Adjustment (B1). Adjust until the waveform measured is as the one shown in Fig. 33.



2. Connect the oscilloscope to TP47G (A-Board) or to TP35.
3. Select DAC Sub-Color Adjustment (B0) and adjust for peak to peak amplitude to be **0.9Vp-p ±0.05V** for 27" models as shown in Fig. 34.



4. Remove the jumpers (Preparation steps 4 & 5).

## Color Temperature Adjustment (B/W Tracking)

### Serviceman DAC Adjust. (C0) (C1) (C2) (C3) (C4) Minor Touch-Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good gray scale and warm highlights".

1. LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select Cutoff (C0) RED, (C1) GRN, (C2) BLU and adjust the picture for gray.
2. HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C3) RED, (C4) BLU and adjust the picture for warm whites.

## Complete Adjustment

### Preparation:

1. Turn the Receiver "ON" and allow 10 minutes warm up at high brightness.
2. Apply a color bar signal with color "OFF".
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

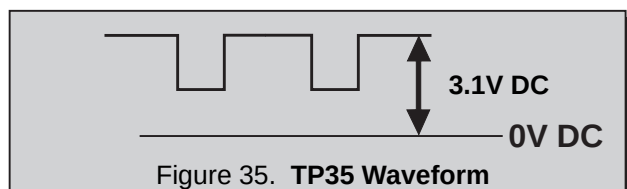
### Procedure:

Preset the following Serviceman DACs for best results:

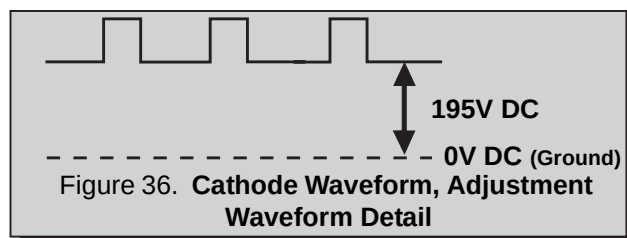
- C0 ..... 0 128
- C1 ..... . 64
- C2 ..... 0 128

- C3 ..... . 64
- C4 ..... . 64

1. Connect the oscilloscope to TP35.
2. In Serviceman Mode for making electronic adjustment, select the Sub-Bright DAC (B2).
3. Press the R-Tune key on the remote.
4. Observe the oscilloscope waveform at Horizontal rate and adjust the Serviceman Mode Sub-Bright DAC (B2) level until a scanning period of **3.1V** above DC ground is measured, as indicated in Fig. 35.



5. Connect the scope to GRN Cathode (KG) on the CRT-Board.
6. In the Serviceman Mode for making electronic adjustments, select the GREEN CUTOFF DAC (C1).
7. Press the R-Tune key on the remote.
8. View scope trace at Horizontal rate and adjust the Serviceman Mode DAC (C1) level until a scanning period of **195V** above DC ground is measured, as indicated in Fig. 36.



9. Connect the scope to the RED Cathode (KR).
10. In Serviceman Mode for making electronic adjustments, select the RED CUTOFF DAC (C0).
11. Press the R-Tune key on the Remote
12. View the scope trace and adjust the Serviceman Mode DAC (C0) for the scanning period to be **195V** above DC ground. (See Fig. 36)
13. Connect the scope to the BLU Cathode (KB).
14. In Serviceman Mode for making electronic adjustments, select the BLU CUTOFF (C2).
15. Press the R-Tune key on the Remote.
16. View the scope trace and adjust the Serviceman Mode DAC (C2) for the scanning period to be **195V** above DC ground. (See Fig. 36)
17. Turn the Screen Control (part of FBT) slowly clockwise until a color horizontal line appears.
18. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C0) RED, (C2) BLU; increase the colors to create a white horizontal line.
19. Confirm that a good gray scale is established by viewing B/W color bar pattern.

# Service Adjustments (Electronic Controls, cont.)

20. In the Serviceman Mode for making electronic adjustments select the DAC DRIVE adjustments (C3) RED, (C4) BLUE and adjust for warm white in a white color bar pattern.
21. EXIT the Serviceman Mode.
22. Adjust the Picture Menu Video Adjustments **Bright** and **Picture** from low scale to high scale and check Black and White tracking.
23. If correction is needed: Re-Enter the Serviceman Mode and perform the **Minor Touch – Up Method**.
24. Perform **Sub-Brightness** Adjustment procedure if needed.

## Horizontal Centering

### Serviceman DAC Adjustment (C9)

#### Preparation:

Connect a crosshatch generator.

#### Procedure:

1. In the Serviceman Mode for making electronic adjustments. Select the Horizontal Centering Adjustment DAC (C9) and adjust until the center of the crosshatch pattern is centered on CRT.
2. EXIT the Serviceman Adjustment Mode.

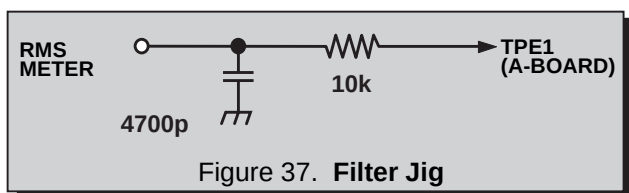
## Audio Adjustment

### Serviceman DAC Adjustment (B6)

This adjustment is factory set and needs to be performed only when IC002 or IC101 is replaced.

#### Preparation:

1. Apply the following signal at the antenna (70dB  $\pm$ 5dB, 75 $\Omega$  open P/S 10dB): audio signal set to monaural, 300Hz, 100% modulation; video input of 100 IRE flat field, 30% modulation.
2. Connect the RMS Meter with filter jig as shown in Fig. 37.



#### Procedure:

1. In the Serviceman Mode for making electronic adjustments, select the Audio Adjustment DAC (B6) and adjust until 75mV RMS  $\pm$  7.5mV RMS is measured.
2. EXIT the Serviceman Adjustment Mode.

## MTS Circuit Adjustments

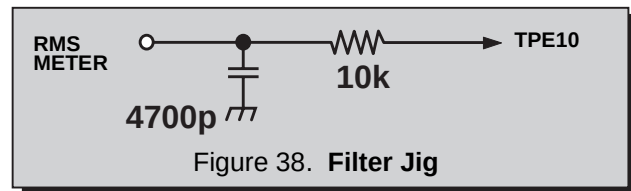
The MTS Circuit Adjustments require two steps:

1. Input Level Adjustment.
2. Stereo Separation Adjustment.

## Input Level Adjustment (M0)

#### Preparation:

1. Connect an RMS meter with filter jig as shown in Fig. 38.



2. Connect an RF signal generator to the RF antenna input.

#### Procedure:

1. Apply the following signal from the RF signal generator:  
Video: 100 IRE flat field, 30% modulation.  
Audio: 300Hz, 100% modulation, monaural (70  $\pm$ 5dB, 75 $\Omega$  OPEN, P/S 10dB).
2. Adjust the MTS Input Level Adjustment (M0) until the voltage measured is 106  $\pm$  6.0mV rms.

## Stereo Separation Adjustment (M1 & M2)

#### Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect a scope to TPE10.

#### Procedure:

1. Select Stereo Mode in Audio menu
2. Apply the following signal from the RF signal generator:  
Video: 100 IRE flat field, 30% modulation.  
Audio: 300Hz, 100% modulation, stereo (left only) (70  $\pm$ 5dB, 75 $\Omega$  OPEN, P/S 10dB).
3. Adjust the MTS Low-Level Separation Adjustment (M2) until the amplitude displayed on the scope is minimum.
4. Apply the following signal from the RF signal generator:  
Video: 100 IRE flat field, 30% modulation.  
Audio: 3KHz, 100% modulation, stereo (left only) (70  $\pm$ 5dB, 75 $\Omega$  OPEN, P/S 10dB).
5. Adjust the MTS High-Level Separation Adjustment (M1) until the amplitude displayed on the scope is minimum.
6. Repeat above steps 2 through 5 until the amplitude is at minimum for both signals.

## Service Adjustments (Electronic Controls, cont.)

### Clock Adjustment (Sb)

#### Preparation:

Connect the frequency counter from TPS1 (IC001 Pin 13) to cold ground (  $\rightarrow$  ).

**Note:** Frequency Counter probe capacitance should be 8pF or less.

#### Procedure:

1. Turn the Receiver "OFF" with the AC power applied.
2. Measure TPS1 (IC001 pin 13) for the frequency of the waveform and record the reading.

**Note:** Pin 13 measurement must have at least four digits of resolution following the decimal point.  
Example: 000.0000

3. Turn the Receiver back "ON".
4. Place the Receiver into Serviceman Mode for making electronic adjustment, select the Clock Adjustment DAC (Sb).

5. Calculate and set Sb based on the following formula:

$$Sb = 128 + 0.901 \times 10^6 \frac{244.1406 - pin13[Hz]}{244.1406}$$

**Note:** Pin 13 measurement will not change regardless of the value stored in Sb.

### Vertical Size (B7)

1. Adjust the VERTICAL SIZE DAC control, B7, until the top and the bottom edges of the raster are visible.
2. Adjust the VERTICAL SIZE control, B7, until the top and the bottom of the raster touch the bezel edge. The advance SIZE control to obtain an approximately 10% overscan. Linearity adjustment is done automatically when the size is being adjusted. (Best results can be obtained with a round test pattern.)

## Service Adjustments (Mechanical Controls)

### VCO Field Alignment L105 (IC101 pins 35 & 36)

1. Turn Receiver ON and let it warm up for a minimum of 20 minutes prior to continuing with the adjustments.
2. Connect a balance antenna and select a midband channel (Ch 10, 11 or 12)
3. Attenuate the signal strength for a weak noisy video.
4. While observing the picture tube, adjust L105 until best picture appears.
5. Change channels and observe that they are tuning properly.
6. If the channel monitored is not clear, repeat steps 1, 3 and 4 while applying a stronger signal.

### Focus (part of T551)

#### Preparation:

Connect a Signal generator and select a dot pattern.

#### Procedure:

Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.

- a. Adjust for best center.
- b. Adjust for best area between the center and top right corner.

The diagram illustrates a Hi-Fi receiver circuit, divided into three main sections: A (Tuner and Processor), JJ (Detector and Amplifier), and G (Front End and Output).

**Section A: Tuner and Processor**

- Tuner 1** is connected to the input and provides a signal to the **SAW Filter (X101)**.
- The **SAW Filter (X101)** outputs to the **VCJ (IC101 AN5166K)**.
- The **VCJ (IC101 AN5166K)** has a **SIF IN** pin (28) connected to a **Q304** component and a **DET OUT** pin (33) connected to the **MTS (IC2201 AN5829S)**.
- The **MTS (IC2201 AN5829S)** has multiple input pins (2, 3, 23, 24) connected to the **Audio Input 1** and **Audio Input 2** jacks.
- The **MTS (IC2201 AN5829S)** has output pins (14, 21, 22) connected to the **Audio Amplifier (AN5272)**.

**Section JJ: Detector and Amplifier**

- The **VCJ (IC3002)** has a **DVD L** pin (6) connected to the **SAW Filter (X101)** and a **DVD R** pin (2) connected to the **Audio Amplifier (AN5272)**.
- The **VCJ (IC3002)** has a **MAIN L MAIN R** pin (4) connected to the **Audio Amplifier (AN5272)**.
- The **VCJ (IC3002)** has a **Q302** component connected to its **Q303** pin.

**Section G: Front End and Output**

- The **Front Input** is connected to the **Audio Amplifier (AN5272)**.
- The **Audio Amplifier (AN5272)** has output pins (1, 4, 6, 7) connected to the **Speaker (L and R)**.
- The **Audio Amplifier (AN5272)** has a **Q2363** component connected to its **Q2366** pin.

**Power and Grounding**

- The circuit is powered by a **12V** battery.
- Grounding is indicated by the **0V** symbol.

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# Video-Chroma Signal Path Block Diagram

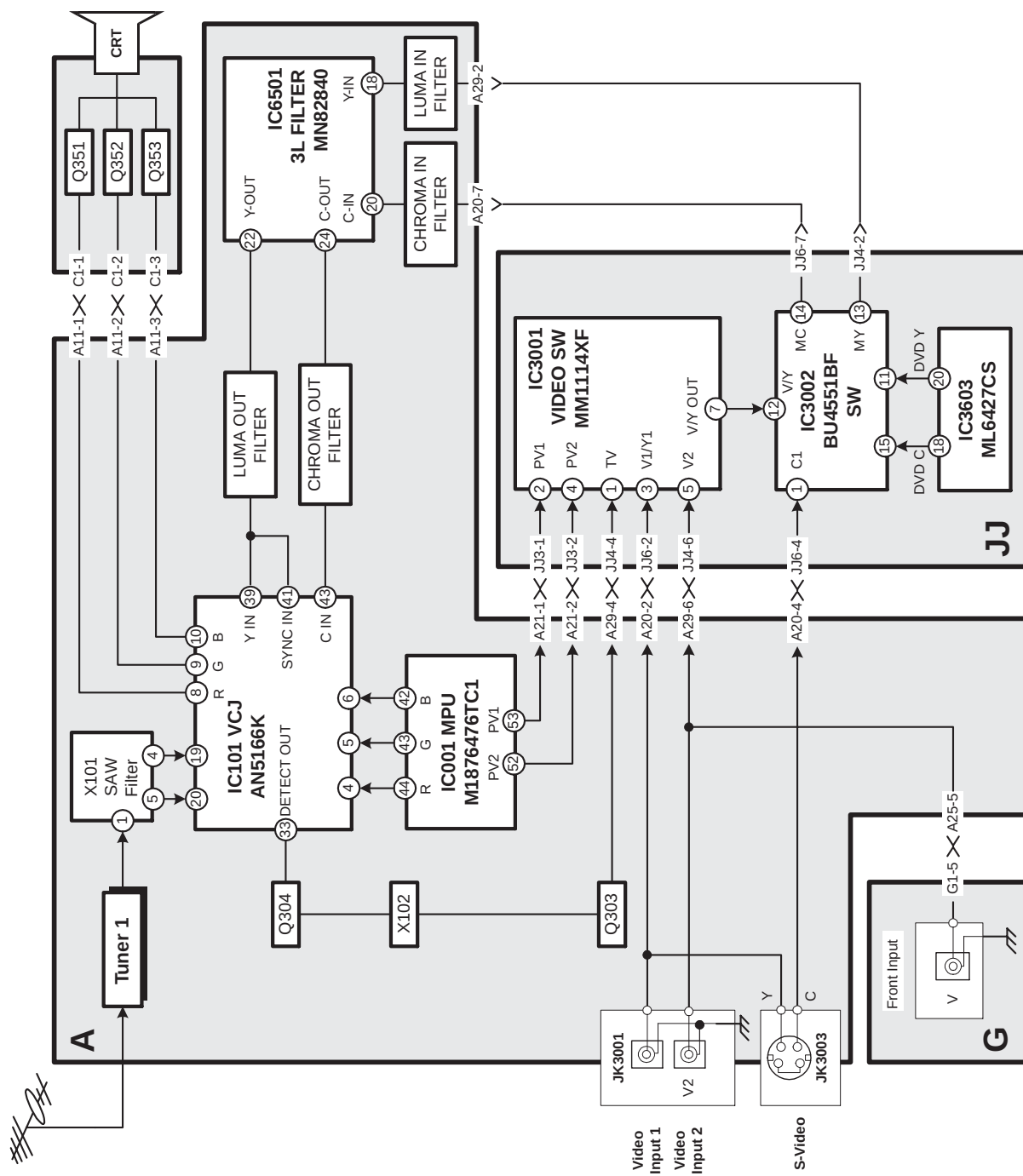


Figure 40. Video-Chroma Path Block Diagram

# Sync Signal Path Block Diagram

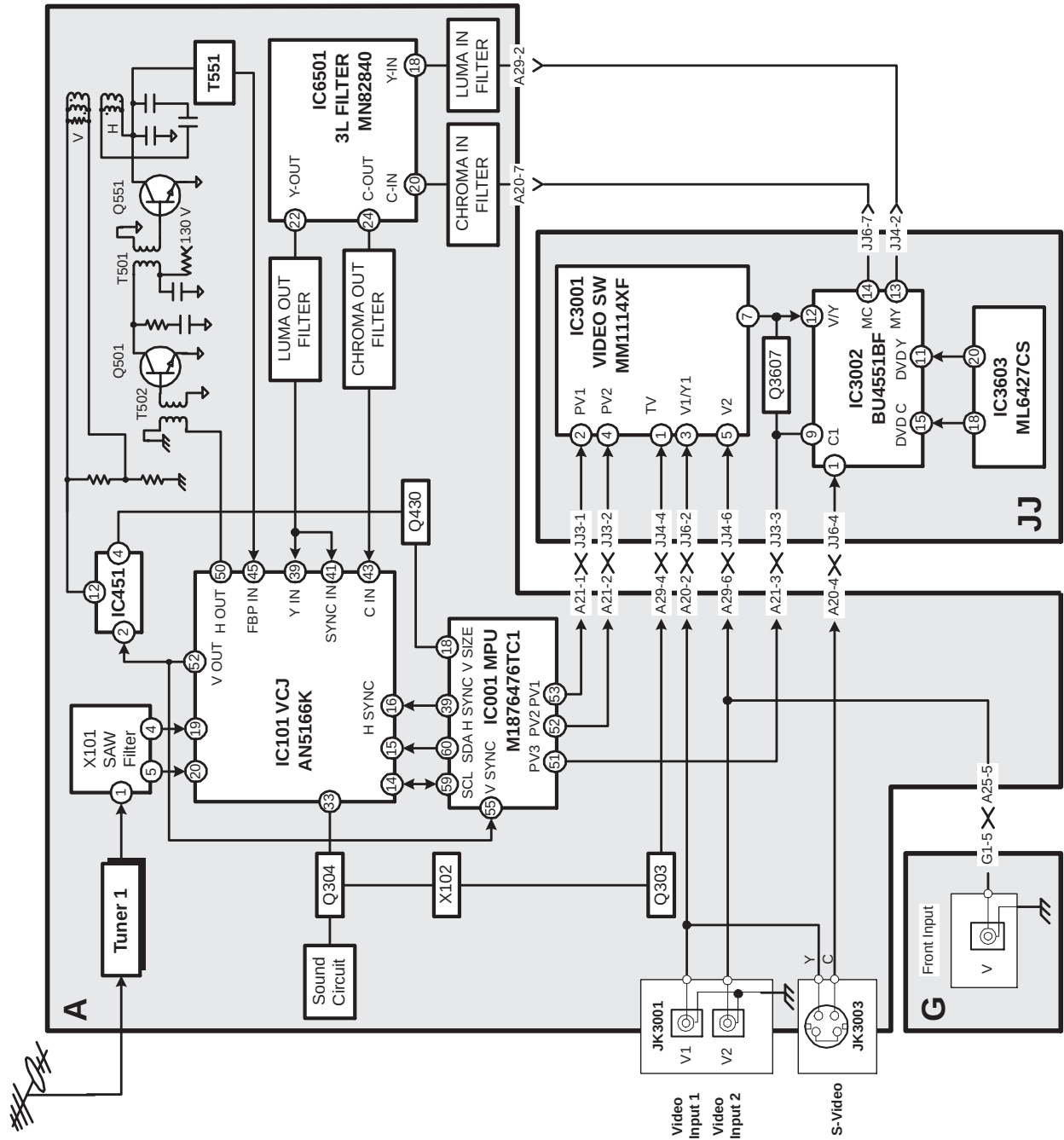


Figure 41. Sync Signal Path Block Diagram

## IC101 IN/OUT Pins and Functions (VCJ)

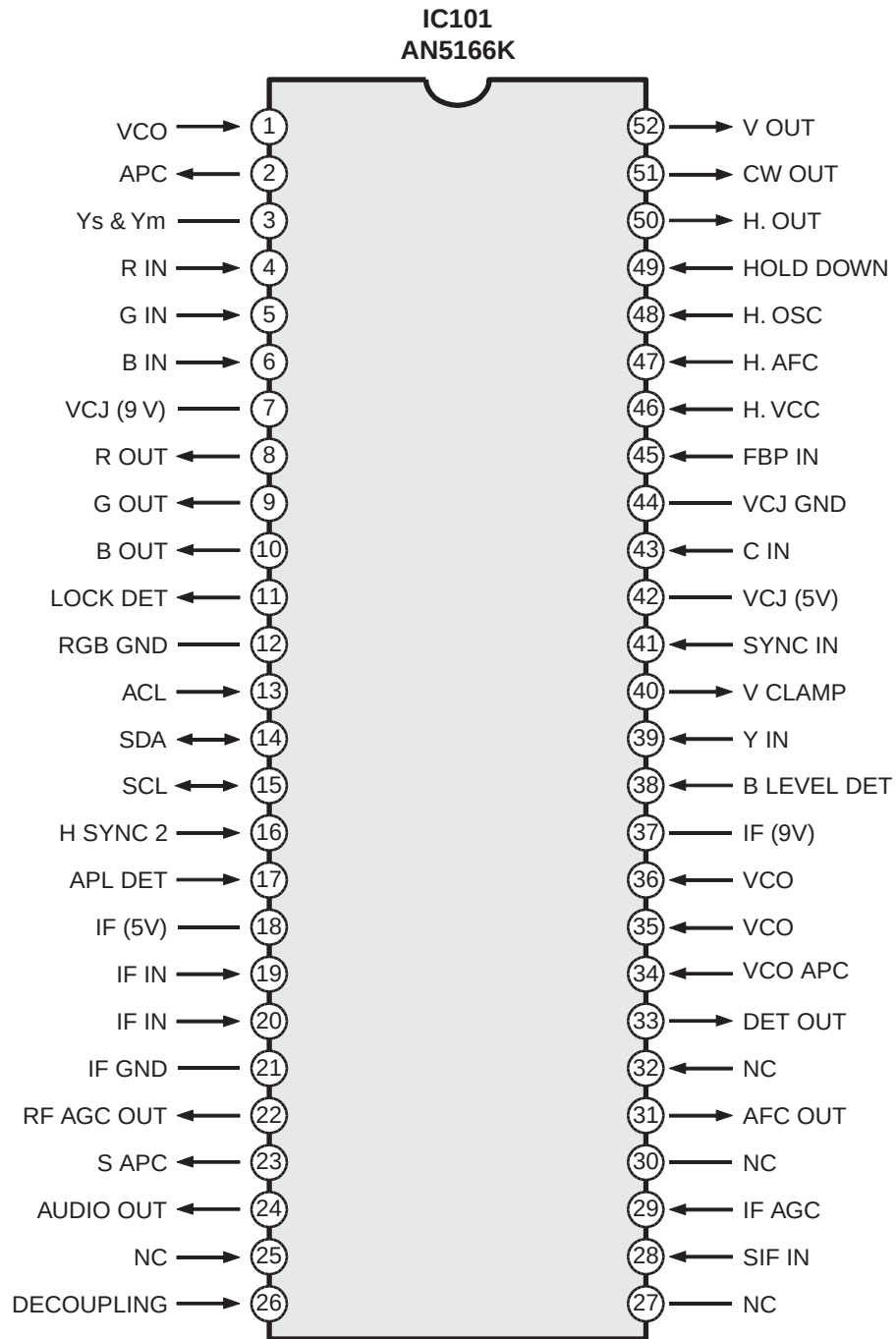


Figure 42. IC101 IN/OUT Pins and Functions (VCJ).

# IC001 IN/OUT Pins and Functions (MPU)

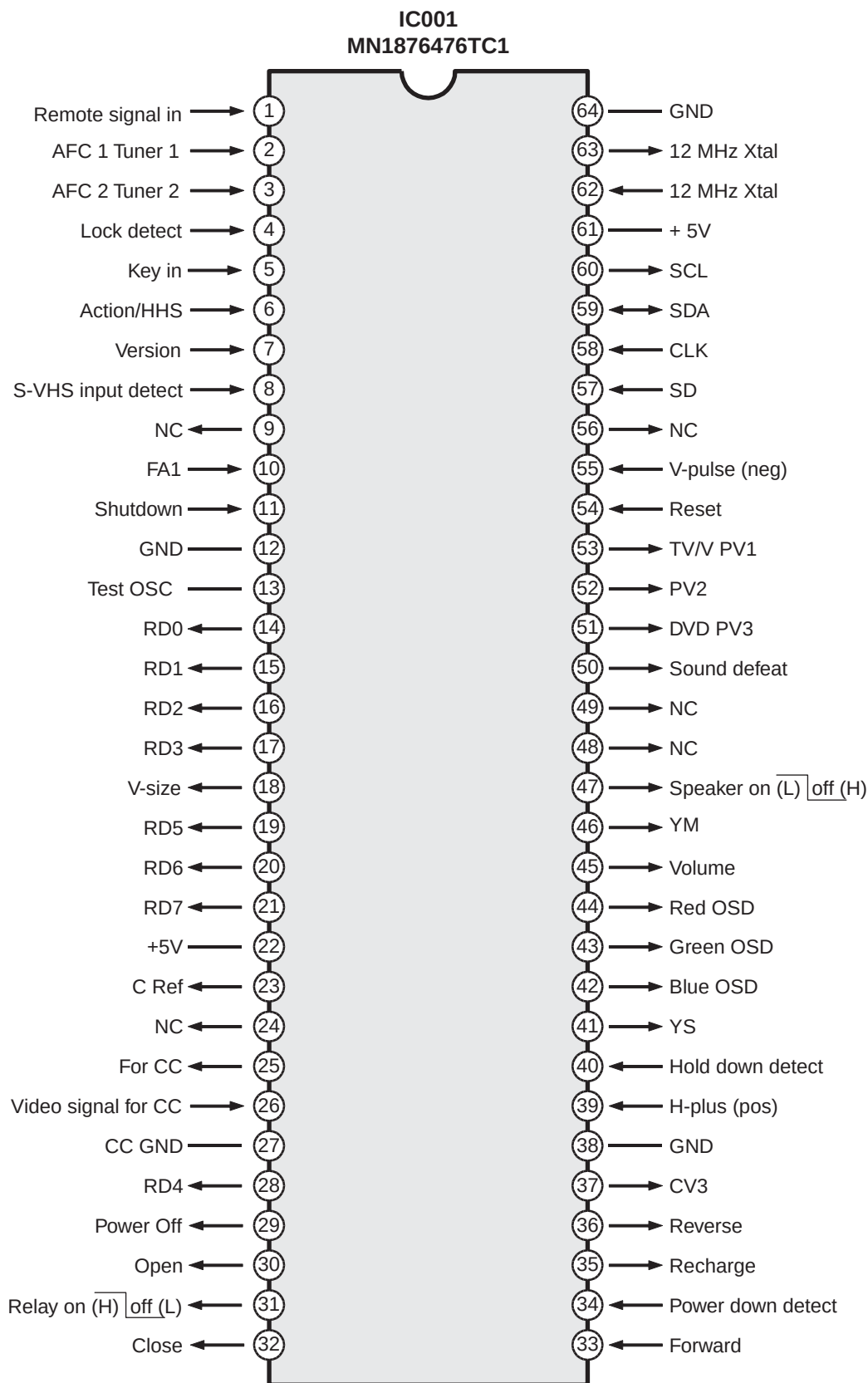


Figure 43. IC001 IN/OUT Pins and Functions (MPU)

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO.           | PART NO.     | DESCRIPTION           | REF NO.     | PART NO.            | DESCRIPTION                 |
|-------------------|--------------|-----------------------|-------------|---------------------|-----------------------------|
| <b>CAPRISTORS</b> |              |                       | C302        | EEANA1E1R0B         | CAP,E 1.0UF-25V             |
| CRA801            | EXNG131P365  | RES-CAP 130PF/3.6 MEG | C304        | ECEA1HNR47U         | CAP,E .47UF-50V             |
| CRA802            | EXNG131P365  | RES-CAP 130PF/3.6 MEG | C305        | ECA1HM4R7           | CAP,E 4.7UF/50V             |
| CRA851            | EXNG131P365  | RES-CAP 130PF/3.6 MEG | C306        | ECA1CM221           | CAP,E 220UF/16V             |
| <b>CAPACITORS</b> |              |                       | C308        | ECQB1H823JM         | CAP,P .082UF-J-50V          |
| C001              | ECA1CM101    | CAP,E 100UF/16V       | C309        | ECA1CM101           | CAP,E 100UF/16V             |
| C002              | ECJ2VB1H102K | CAP,C .001UF-K-50V    | C310        | ECA1HM4R7           | CAP,E 4.7UF/50V             |
| C003              | ECA1HM220    | CAP,E 22UF/50V        | C311        | ECA1HM4R7           | CAP,E 4.7UF/50V             |
| C005              | ECA1CM331    | CAP,E 330UF/16V       | C312        | ECA1HM220           | CAP,E 22UF/50V              |
| C006              | ECJ2VB1H102K | CAP,C .001UF-K-50V    | C351        | TACCW331T50V        | CAP,C 330PF/50V             |
| C008              | ECJ2VF1H103Z | CAP,C .01UF-Z-50V     | C352        | TACCW331T50V        | CAP,C 330PF/50V             |
| C010              | ECJ2VF1H103Z | CAP,C .01UF-Z-50V     | C353        | TACCW331T50V        | CAP,C 330PF/50V             |
| C011              | ECA1CM221    | CAP,E 220UF/16V       | C354        | ECKD3D102KB         | CAP,C .001UF-K-2KV          |
| C013              | ECA1CM101    | CAP,E 100UF/16V       | C357        | EEANA1E1R0B         | CAP,E 1.0UF-25V             |
| C016              | ECJ2VC1H101J | CAP,C 100PF-J-50V     | C401        | ECQB1H153JM         | CAP,P .015UF-J-50V          |
| C017              | ECJ2VC1H220J | CAP,C 22PF-J-50V      | C402        | ECJ2VC1H471J        | CAP,C 470PF-J-50V           |
| C018              | ECJ2VC1H220J | CAP,C 22PF-J-50V      | C403        | ECA1HM2R2           | CAP,E 2.2UF/50V             |
| C019              | ECA1CM101    | CAP,E 100UF/16V       | C451        | ECA1CHG470B         | CAP,E 47UF-16V              |
| C020              | ECA1CM471    | CAP,E 470UF/16V       | C452        | ECSF1EE105          | CAP,T 1.0UF/25V             |
| C021              | ECJ2VF1H103Z | CAP,C .01UF-Z-50V     | C453        | ECA1HHG010B         | CAP,E 1UF-50V               |
| C022              | ECA1CHG471B  | CAP,E 470UF-16V       | C454        | ECA1EM102           | CAP,E 1000UF/25V            |
| C024              | ECA1HM4R7    | CAP,E 4.7UF/50V       | C455        | ECA1VHG101B         | CAP,E 100UF-35V             |
| C025              | ECJ2VC1H101J | CAP,C 100PF-J-50V     | C456        | ECQB1H103JM         | CAP,P .01UF-J-50V           |
| C026              | ECA1HM010    | CAP,E 1.0UF/50V       | C459        | ECA1VHG471B         | CAP,E 470UF-35V             |
| C029              | ECJ2VF1H103Z | CAP,C .01UF-Z-50V     | C460        | ECQM1104JZ          | CAP,P .1UF-J-100V           |
| C031              | ECJ2VB1H821K | CAP,C 820PF-K-50V     | C462        | ECA1HM100           | CAP,E 10UF/50V              |
| C032              | ECA1CM470    | CAP,E 47UF/16V        | C502        | ECQB1H223JM         | CAP,P .022UF-J-50V          |
| C033              | ECJ2VC1H680J | CAP,C 68PF-J-50V      | C503        | ECA1HM2R2           | CAP,E 2.2UF/50V             |
| C034              | ECJ2VC1H680J | CAP,C 68PF-J-50V      | C504        | ECJ2VC1H221J        | CAP,C 220PF-J-50V           |
| C036              | ECJ2VC1H220J | CAP,C 22PF-J-50V      | C505        | ECJ2VU1H221J        | CAP,C 220PF-J-50V           |
| C037              | ECJ2VC1H220J | CAP,C 22PF-J-50V      | C506        | ECA1CM221           | CAP,E 220UF/16V             |
| C038              | ECJ2VC1H220J | CAP,C 22PF-J-50V      | C508        | ECJ2VC1H331J        | CAP,C 330PF-J-50V           |
| C040              | ECA1EHG470B  | CAP,E 47UF-25V        | C510        | ECCD2H100D          | CAP,C 10PF-D-500V           |
| C041              | ECJ2VC1H330J | CAP,C 33PF-J-50V      | C511        | ECKD2H821KB         | CAP,C 820PF-K-500V          |
| C101              | ECJ2VF1H223Z | CAP,C .022UF-Z050V    | C512        | ECKD2H101KB         | CAP,C 100PF-K-500V          |
| C102              | ECA1CM101    | CAP,E 100UF/16V       | <b>C531</b> | <b>ECA1HM220</b>    | <b>CAP,E 22UF/50V</b>       |
| C103              | ECJ2VC1H300J | CAP,C 30PF-J-50V      | C532        | ECA1CM102           | CAP,E 1000UF/16V            |
| C105              | ECJ2VC1H221J | CAP,C 220PF-J-50V     | C534        | ECJ2VF1H103Z        | CAP,C .01UF-Z-50V           |
| C106              | ECA1HMR47    | CAP,E .47UF/50V       | <b>C551</b> | <b>ECA1VM331</b>    | <b>CAP,E 330UF/35V</b>      |
| C107              | ECJ2VC1H390J | CAP,C 39PF-J-50V      | <b>C552</b> | <b>ECA1CM331</b>    | <b>CAP,E 330UF/16V</b>      |
| C108              | ECA1HMR22    | CAP,E .22UF/50V       | <b>C553</b> | <b>ECA1CM331</b>    | <b>CAP,E 330UF/16V</b>      |
| C110              | ECJ2VF1H103Z | CAP,C .01UF-Z-50V     | C554        | ECKD2H561KB         | CAP,C 560PF-K-500V          |
| C111              | ECA1HM100    | CAP,E 10UF/50V        | <b>C555</b> | <b>ECA2EM220</b>    | <b>CAP,E 22UF-250V</b>      |
| C113              | ECA1HM100    | CAP,E 10UF/50V        | <b>C556</b> | <b>ECA1CM102</b>    | <b>CAP,E 1000UF/16V</b>     |
| C114              | ECJ2VC1H120J | CAP,C 12PF-J-50V      | C557        | ECKD2H102KB         | CAP,C .001UF-K-500V         |
| C151              | ECA1HMR22    | CAP,E .22UF/50V       | <b>C558</b> | <b>ECA1CM221</b>    | <b>CAP,E 220UF/16V</b>      |
| C201              | ECJ2VF1H103Z | CAP,C .01UF-Z-50V     | <b>C560</b> | <b>ECEA1HN2R2U</b>  | <b>CAP,E 2.2UF/50V</b>      |
| C202              | ECJ2VC1H101J | CAP,C 100PF-J-50V     | C561        | ECKD2H561KB         | CAP,C 560PF-K-500V          |
| C203              | ECA1HM4R7    | CAP,E 4.7UF/50V       | C562        | ECKD2H561KB         | CAP,C 560PF-K-500V          |
| C301              | ECJ2VC1H390J | CAP,C 39PF-J-50V      | <b>C563</b> | <b>ECWH16822JVB</b> | <b>CAP,P 8200PF-J-1.5KV</b> |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO. | PART NO.     | DESCRIPTION            | REF NO. | PART NO.     | DESCRIPTION         |
|---------|--------------|------------------------|---------|--------------|---------------------|
| C564    | ECWH16272JVY | CAP,P 2700PF-J-1.5KV   | C888    | EEUFC1A331B  | CAP,E 330UF-10V     |
| C565    | ECKD3D561JB  | CAP,C 560PF-J-2KV      | C889    | ECA1AHG102B  | CAP,E 1000UF-10V    |
| C566    | ECKD3D181JB  | CAP,C 180PF-J-2KV      | C891    | ECA0JM102    | CAP,E 1000UF/6.3V   |
| C568    | ECQM2274JZ   | CAP,P .27UF-J-200V     | C892    | EEUFC1V151B  | CAP,E 150UF         |
| C569    | ECWF2474JSR  | CAP,P .47UF-J-200V     | C893    | ECA1HHG330B  | CAP,E 33UF/50V      |
| C571    | ECA1CHG471B  | CAP,E 470UF-16V        | C894    | EEUFC1V151B  | CAPACITOR           |
| C572    | ECA1HM100    | CAP,E 10UF/50V         | C895    | ECA1HHG330B  | CAP,E 33UF/50V      |
| C573    | ECA1CM101    | CAP,E 100UF/16V        | C896    | EEUFC1E331B  | CAPACITOR           |
| C601    | ECJ2VB1H102K | CAP,C .001UF-K-50V     | C897    | ECA1EHG221B  | CAP,E 220UF-25V     |
| C604    | ECJ2VU1H150J | CAP,C 15PF-J-50V       | C898    | ECA1CHG221B  | CAP,E 220UF/16V     |
| C605    | ECJ2VB1H332K | CAP,C .0033UF-K-50V    | C2201   | ECA1HM4R7    | CAP,E 4.7UF/50V     |
| C606    | ECA1HM010    | CAP,E 1.0UF/50V        | C2202   | ECA1HM2R2    | CAP,E 2.2UF/50V     |
| C801    | ECKDAE472ZED | CAP,C .4700PF-Z-250VAC | C2203   | ECA1HM4R7    | CAP,E 4.7UF/50V     |
| C802    | ECKDAE472ZED | CAP,C .4700PF-Z-250VAC | C2204   | ECSF16E10VB  | CAP,T 1UF-16V       |
| C803    | ECKDAE472ZED | CAP,C .4700PF-Z-250VAC | C2205   | ECA1HM010    | CAP,E 1.0UF/50V     |
| C804    | ECKDAE472ZED | CAP,C .4700PF-Z-250VAC | C2206   | ECQB1H223JM  | CAP,P .022UF-J-50V  |
| C805    | EC0S2DA221BB | CAP,E 220UF/200V       | C2207   | ECSF16E3R3   | CAP,T 3.3UF/16V     |
| C806    | EC0S2DA221BB | CAP,E 220UF/200V       | C2208   | ECJ2VB1C104K | CAP,C .1UF-I-16V    |
| C807    | ECA1HM2R2    | CAP,E 2.2UF/50V        | C2209   | ECJ2VB1C104K | CAP,C .1UF-I-16V    |
| C808    | ECA1CM101    | CAP,E 100UF/16V        | C2210   | ECJ2VB1C104K | CAP,C .1UF-I-16V    |
| C809    | EC0S2DG151DG | CAP,E 151UF/200V       | C2212   | ECQB1H473JM  | CAP,P .047UF-J-50V  |
| C810    | ECQU2A103MV  | CAP,P .01UF-M-250VAC   | C2215   | ECA1CM101    | CAP,E 100UF/16V     |
| C811    | ECQU2A103MV  | CAP,P .01UF-M-250VAC   | C2218   | ECA1HMR47    | CAP,E .47UF/50V     |
| C812    | ECQU2A224MV  | CAP,P .22UF-M-250VAC   | C2220   | EEANA1E100B  | CAP,E 10UF-25V      |
| C814    | ECQB1H823JM  | CAP,P .082UF-J-50V     | C2301   | ECA1VM102    | CAP,E 1000UF/35V    |
| C815    | ECA1EHG101B  | CAP,E 100UF-25V        | C2302   | ECA1HM010    | CAP,E 1.0UF/50V     |
| C818    | ECKD3A821KB  | CAP,C 820PF-K-1KVDC    | C2305   | ECA1HM010    | CAP,E 1.0UF/50V     |
| C820    | ECA1JHG100B  | CAP,E 10UF-63V         | C2306   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   |
| C821    | ECKD2H561KB  | CAP,C 560PF-K-500V     | C2307   | ECA1CM102    | CAP,E 1000UF/16V    |
| C822    | ECA1VHG221B  | CAP,E 220UF-35V        | C2308   | ECKR1H103ZF5 | CAP,C .01UF-Z-50V   |
| C823    | ECA160V33UE  | CAP,E 33UF/160V        | C2309   | ECQB1H473JM  | CAP,P .047UF-J-50V  |
| C824    | ECKD3A331KB  | CAP,C 330PF-K-1KV      | C2311   | ECA1HM3R3    | CAP,E 3.3UF/50V     |
| C825    | ECKD3A471KB  | CAP,C 470PF-K-1KV      | C2313   | ECA1VM101    | CAP,E 100UF/35V     |
| C853    | TACA5102G125 | CAP, C                 | C2314   | ECQB1H473JM  | CAP,P .047UF-J-50V  |
| C855    | TACA522G125  | CAP, C                 | C2315   | ECA1HM100    | CAP,E 10UF/50V      |
| C859    | ECA2DHG101E  | CAP,E 100UF-200V       | C2321   | ECA1HM100    | CAP,E 10UF/50V      |
| C861    | ECKD3A471KB  | CAP,C 470PF-K-1KV      | C2324   | ECA1HM100    | CAP,E 10UF/50V      |
| C862    | ECKD3A182KB  | CAP,C .0018UF-K-1KV    | C2325   | ECA1CM102    | CAP,E 1000UF/16V    |
| C864    | ECQB1H223JF  | CAP,P .022UF-J-50V     | C2326   | ECJ2VB1H223K | CAP,C .022UF-K-50V  |
| C866    | ECQB1H104JF  | CAP,P .1UF-J-50V       | C2327   | ECJ2VB1H223K | CAP,C .022UF-K-50V  |
| C867    | ECQB1H683JF  | CAP,P .068UF-J-50V     | C2328   | ECJ2VB1H223K | CAP,C .022UF-K-50V  |
| C868    | ECQB1H104JF  | CAP,P .1UF-J-50V       | C2329   | ECJ2VB1H223K | CAP,C .022UF-K-50V  |
| C871    | ECA1EHG470B  | CAP,E 47UF-25V         | C2331   | EEANA1E100B  | CAP,E 10UF-25V      |
| C881    | ECQV1H104JL  | CAP,P .10UF-J-50V      | C2332   | EEANA1E100B  | CAP,E 10UF-25V      |
| C882    | ECQB1H223JF  | CAP,P .022UF-J-50V     | C2333   | ECA1HM0R1    | CAP,E 0.1UF/50V     |
| C883    | EEUFC1A102B  | CAP,E 1000UF-10V       | C2334   | ECJ2VB1H472K | CAP,C .0047UF-K-50V |
| C884    | ECA1AHG102B  | CAP,E 1000UF-10V       | C2335   | ECA1VM470    | CAP,E 47UF/35V      |
| C885    | ECFR1E104KR2 | CAP,C .10UF-25V        | C2336   | ECQB1H104JM  | CAP,P .1UF-J-50V    |
| C886    | ECA1CHG221B  | CAP,E 220UF/16V        | C2337   | ECA1HM0R1    | CAP,E 0.1UF/50V     |
| C887    | ECA0JM102    | CAP,E 1000UF/6.3V      | C2338   | ECA1HM4R7    | CAP,E 4.7UF/50V     |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO. | PART NO.     | DESCRIPTION         | REF NO.       | PART NO.     | DESCRIPTION       |
|---------|--------------|---------------------|---------------|--------------|-------------------|
| C2339   | ECA1HM100    | CAP,E 10UF/50V      | C3622         | ECJ2VB1H103K | CAP,C .01UF-K-50V |
| C2340   | ECA1HMR47    | CAP,E .47UF/50V     | C3623         | EEUFC1C471B  | CAP,E 470UF-16V   |
| C2341   | ECA1HM4R7    | CAP,E 4.7UF/50V     | C3624         | ECA0JM102    | CAP,E 1000UF/6.3V |
| C2342   | ECA1HM4R7    | CAP,E 4.7UF/50V     | C3625         | ECA0JM102    | CAP,E 1000UF/6.3V |
| C2343   | ECA1HM4R7    | CAP,E 4.7UF/50V     | C3626         | ECJ2VB1H331K | CAP,C 330PF-K-50V |
| C2344   | ECJ2VB1H472K | CAP,C .0047UF-K-50V | C3627         | ECJ2VB1H331K | CAP,C 330PF-K-50V |
| C2345   | ECA1HM0R1    | CAP,E 0.1UF/50V     | C3628         | ECJ2VF1H104Z | CAP,C .1UF-Z-50V  |
| C2346   | ECA1VM470    | CAP,E 47UF/35V      | C4138         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C2347   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C4591         | ECEA1CKA101  | CAP,E 100UF/16V   |
| C2351   | ECA1HM010    | CAP,E 1.0UF/50V     | C4592         | ECKF1H103ZF  | CAP,C .01UF-Z-50V |
| C2353   | ECA1HM010    | CAP,E 1.0UF/50V     | C6501         | ECA1CM101    | CAP,E 100UF/16V   |
| C2359   | ECA1HM010    | CAP,E 1.0UF/50V     | C6502         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C2360   | ECA1HM010    | CAP,E 1.0UF/50V     | C6503         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C2362   | ECA1VM470    | CAP,E 47UF/35V      | C6504         | ECJ2VC1H330J | CAP,C 33PF-J-50V  |
| C3011   | ECA1HM010    | CAP,E 1.0UF/50V     | C6507         | ECJ2VC1H120J | CAP,C 12PF-J-50V  |
| C3012   | ECA1HM010    | CAP,E 1.0UF/50V     | C6509         | ECJ2VC1H270J | CAP,C 27PF-J-50V  |
| C3013   | ECA1HM100    | CAP,E 10UF/50V      | C6510         | ECJ2VC1H120J | CAP,C 12PF-J-50V  |
| C3014   | ECA1HM100    | CAP,E 10UF/50V      | C6511         | ECA1HM010    | CAP,E 1.0UF/50V   |
| C3018   | ECA1HM010    | CAP,E 1.0UF/50V     | C6512         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C3019   | ECA1HM010    | CAP,E 1.0UF/50V     | C6513         | ECJ2VC1H270J | CAP,C 27PF-J-50V  |
| C3025   | ECA1HM100    | CAP,E 10UF/50V      | C6514         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C3234   | ECA1VM470    | CAP,E 47UF/35V      | C6516         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C3235   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C6517         | ECEA1HN010U  | CAP,E 1UF/50V     |
| C3236   | ECA1CM221    | CAP,E 220UF/16V     | C6518         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C3237   | ECA1CM221    | CAP,E 220UF/16V     | C6520         | ECA1HM100    | CAP,E 10UF/50V    |
| C3240   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C6521         | ECEA1CKA470  | CAP,E 47UF/16V    |
| C3331   | ECA1CM101    | CAP,E 100UF/16V     | C6522         | ECJ2VC1H221J | CAP,C 220PF-J-50V |
| C3332   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C6523         | ECJ2VF1H104Z | CAP,C .1UF-Z-50V  |
| C3501   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C6524         | ECA1HM010    | CAP,E 1.0UF/50V   |
| C3503   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C6525         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C3505   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | C6526         | ECA1HM3R3    | CAP,E 3.3UF/50V   |
| C3506   | ECA1CM221    | CAP,E 220UF/16V     | C6527         | ECJ2VF1H104Z | CAP,C .1UF-Z-50V  |
| C3601   | ECA1VM221    | CAP,E 220UF/35V     | C6528         | ECA1CM101    | CAP,E 100UF/16V   |
| C3602   | ECA1CM470    | CAP,E 47UF/16V      | C6529         | ECEA1CN100U  | CAP,E 10UF-16V    |
| C3603   | ECA1CM470    | CAP,E 47UF/16V      | C6531         | ECJ2VF1H103Z | CAP,C .01UF-Z-50V |
| C3604   | ECA1CM221    | CAP,E 220UF/16V     | C6532         | ECJ2VB1H103K | CAP,C .01UF-K-50V |
| C3605   | ECA1CM221    | CAP,E 220UF/16V     | <b>DIODES</b> |              |                   |
| C3606   | ECJ2VF1H104Z | CAP,C .1UF-Z-50V    | D001          | ERA15-01     | DIODE             |
| C3607   | ECJ2VF1H104Z | CAP,C .1UF-Z-50V    | D002          | MA165        | DIODE             |
| C3608   | ECJ2VC1H101J | CAP,C 100PF-J-50V   | D003          | MA4047H      | DIODE             |
| C3609   | ECJ2VC1H101J | CAP,C 100PF-J-50V   | D006          | MA4330H      | DIODE             |
| C3610   | ECJ2VC1H102J | CAP,C .001UF-J-50V  | D008          | MA165        | DIODE             |
| C3611   | ECJ2VC1H102J | CAP,C .001UF-J-50V  | D009          | MA165        | DIODE             |
| C3614   | ECA1HM100    | CAP,E 10UF/50V      | D011          | MA165        | DIODE             |
| C3615   | ECA1HM100    | CAP,E 10UF/50V      | D012          | MA4056M      | DIODE             |
| C3616   | ECJ2VC1H102J | CAP,C .001UF-J-50V  | D013          | MA4056M      | DIODE             |
| C3617   | ECJ2VC1H102J | CAP,C .001UF-J-50V  | D014          | MA165        | DIODE             |
| C3619   | ECA1CM221    | CAP,E 220UF/16V     | D015          | MA165        | DIODE             |
| C3620   | ECJ2VF1H103Z | CAP,C .01UF-Z-50V   | D016          | MA165        | DIODE             |
| C3621   | ECJ2VB1H471K | CAP,C 470PF-K-50V   | D017          | MA165        | DIODE             |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO.     | PART NO.          | DESCRIPTION              | REF NO.                    | PART NO.          | DESCRIPTION                 |
|-------------|-------------------|--------------------------|----------------------------|-------------------|-----------------------------|
| D025        | MA4056M           | DIODE                    | D2301                      | MA165             | DIODE                       |
| D026        | MA4056M           | DIODE                    | D2305                      | MA4110M           | DIODE, ZENER                |
| D046        | MA4056M           | DIODE                    | D2306                      | MA4110M           | DIODE, ZENER                |
| D047        | MA4056M           | DIODE                    | D2307                      | MA4110M           | DIODE, ZENER                |
| D451        | ERA15-01          | DIODE                    | D2308                      | MA4110M           | DIODE, ZENER                |
| D452        | MA4047M           | DIODE, ZENER             | D2315                      | MA165             | DIODE                       |
| D453        | MA165             | DIODE                    | D2342                      | MA165             | DIODE                       |
| D461        | MA27WTA           | DIODE                    | D2343                      | MA165             | DIODE                       |
| D501        | MA4082L           | DIODE                    | D3001                      | MA4110M           | DIODE, ZENER                |
| <b>D531</b> | <b>AS01</b>       | <b>DIODE</b>             | D3002                      | MA4110M           | DIODE, ZENER                |
| <b>D532</b> | <b>MA4062L</b>    | <b>DIODE</b>             | D3003                      | MA4110M           | DIODE, ZENER                |
| <b>D551</b> | <b>TVSRU2N</b>    | <b>DIODE</b>             | D3004                      | MA4110M           | DIODE, ZENER                |
| <b>D554</b> | <b>BYD33G-163</b> | <b>DIODE</b>             | D3005                      | MA4110M           | DIODE, ZENER                |
| D555        | MA165             | DIODE                    | D3006                      | MA4110M           | DIODE, ZENER                |
| D556        | MA4360H           | DIODE, ZENER             | D3007                      | MA4110M           | DIODE, ZENER                |
| <b>D557</b> | <b>TVSRU2N</b>    | <b>DIODE</b>             | D3008                      | MA4110M           | DIODE, ZENER                |
| <b>D558</b> | <b>RS3FS</b>      | <b>DIODE</b>             | D3009                      | MA4110M           | DIODE, ZENER                |
| <b>D559</b> | <b>BYD33G-113</b> | <b>DIODE</b>             | D3010                      | MA4110M           | DIODE, ZENER                |
| D560        | MA165             | DIODE                    | D3013                      | MA4110M           | DIODE, ZENER                |
| <b>D561</b> | <b>BYD33G-163</b> | <b>DIODE</b>             | D3014                      | MA4110M           | DIODE, ZENER                |
| <b>D801</b> | <b>EM02BM 0</b>   | <b>DIODE</b>             | D3015                      | MA4110M           | DIODE, ZENER                |
| <b>D802</b> | <b>EM02BM 0</b>   | <b>DIODE</b>             | D3016                      | MA4110M           | DIODE, ZENER                |
| <b>D805</b> | <b>TAP111M003</b> | <b>DIODE</b>             | D3017                      | MA4110M           | DIODE, ZENER                |
| D806        | MA4047M           | DIODE, ZENER             | D3018                      | MA4110M           | DIODE, ZENER                |
| D807        | MA165             | DIODE                    | D3019                      | MA4110M           | DIODE, ZENER                |
| D809        | RU3YX-M           | DIODE                    | D3020                      | MA4110M           | DIODE, ZENER                |
| D820        | EU02V1            | DIODE                    | D3021                      | MA4110M           | DIODE, ZENER                |
| D821        | EU02V1            | DIODE                    | D3022                      | MA4110M           | DIODE, ZENER                |
| D822        | EU02V1            | DIODE                    | D3331                      | GP1F32T           | AUDIO OUTPUT                |
| D823        | RL30A             | DIODE                    | D3601                      | AK04V0            | DIODE                       |
| D824        | EU02V1            | DIODE                    | D3602                      | AK04V0            | DIODE                       |
| <b>D825</b> | <b>TVSSR2KL</b>   | <b>DIODE, PROTECTION</b> | D3603                      | MA4100M           | DIODE, ZENER                |
| D826        | EU02V1            | DIODE                    | D3604                      | MA4100M           | DIODE, ZENER                |
| D829        | MA165             | DIODE                    | D3605                      | MA4110M           | DIODE, ZENER                |
| <b>D830</b> | <b>MA4270M</b>    | <b>DIODE</b>             | D3606                      | MA4110M           | DIODE, ZENER                |
| <b>D856</b> | <b>TVSS1WBS80</b> | <b>DIODE</b>             | D3607                      | MA4100M           | DIODE, ZENER                |
| D862        | AG01AV0           | DIODE                    | D3608                      | MA4100M           | DIODE, ZENER                |
| D864        | AU01Z             | DIODE                    | <b>FUSES</b>               |                   |                             |
| D866        | 1SS254T-77        | DIODE, SWITCHING         | <b>F801</b>                | <b>XBA2A00101</b> | <b>FUSE 6.3A 125V</b>       |
| D867        | 1SS254T-77        | DIODE, SWITCHING         | <b>F3601</b>               | <b>ICP-N25</b>    | <b>FUSE</b>                 |
| D868        | MA4036M           | DIODE, ZENER             | <b>INTEGRATED CIRCUITS</b> |                   |                             |
| D881        | MA7075            | DIODE                    | IC001                      | MN1876476TC1      | INT CKT                     |
| D883        | EK14V0            | DIODE                    | IC002                      | M24C04-WBN6       | INT CKT                     |
| D888        | EK14V0            | DIODE                    | IC003                      | RPM-637CBRL       | IR RECEIVER, REMOTE CONTROL |
| D891        | EM01ZV0           | DIODE                    | <b>IC101</b>               | <b>AN5166K</b>    | <b>INT CKT</b>              |
| D892        | EK06V0            | DIODE                    | IC451                      | LA7838            | INT CKT                     |
| D893        | MA7150B R         | DIODE                    | IC551                      | AN78M09-LB        | INT CKT                     |
| D894        | EK06V0            | DIODE                    | IC552                      | AN78M05-LB        | INT CKT                     |
| D895        | EK06V0            | DIODE                    | <b>IC801</b>               | <b>PC817X2</b>    | <b>INT CKT</b>              |
| D896        | EK06V0            | DIODE                    | <b>IC803</b>               | <b>STR58041A</b>  | <b>INT CKT</b>              |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

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| REF NO.      | PART NO.          | DESCRIPTION              | REF NO.            | PART NO.            | DESCRIPTION        |
|--------------|-------------------|--------------------------|--------------------|---------------------|--------------------|
| IC866        | PC817X1           | INT CKT                  | L3010              | EXCELSA35           | FERRITE BEAD       |
| IC881        | UPC1093J-1-T      | INT CKT                  | L3011              | EXCELSA35           | FERRITE BEAD       |
| IC891        | PQ07RX11          | INT CKT                  | L3012              | EXCELSA35           | FERRITE BEAD       |
| IC896        | SI-3090F          | INT CKT                  | L3331              | ELESN220JA          | COIL, PEAKING 22UH |
| IC2201       | AN5829S-E1V       | INT CKT                  | L3501              | ELESN220KA          | COIL, PEAKING 22UH |
| IC2302       | AN5272            | INT CKT                  | L3601              | TSKA157             | COIL               |
| IC2321       | CXA2021S          | INT CKT                  | L3602              | TSKA157             | COIL               |
| IC3001       | MM1114XFBE        | INT CKT                  | L3603              | ELESN220KA          | COIL, PEAKING 22UH |
| IC3002       | BU4551BF-E2       | INT CKT                  | L3604              | TSKA157             | COIL               |
| IC3501       | TC74HCT00AFL      | INT CKT                  | L3605              | TSKA157             | COIL               |
| IC3502       | TC74ACT164FL      | INT CKT                  | L6501              | ELESN150KA          | COIL, PEAKING 15UH |
| IC3601       | PQ09DZ1U          | INT CKT                  | L6502              | ELESN330JA          | COIL, PEAKING 33UH |
| IC3602       | NJM4580MTE1       | INT CKT                  | L6504              | ELESN330JA          | COIL, PEAKING 33UH |
| IC3603       | ML6427CS          | INT CKT                  | L6505              | ELESN330JA          | COIL, PEAKING 33UH |
| IC4591       | BA6956AN          | INT CKT                  | L6507              | ELESN150KA          | COIL, PEAKING 15UH |
| IC6501       | MN82840           | INT CKT                  | L6508              | EXCELSA39           | FERRITE BEAD       |
| IC6502       | MN1382RTX         | INT CKT                  | L6510              | EXCELSA35           | FERRITE BEAD       |
| <b>COILS</b> |                   |                          | <b>TRANSISTORS</b> |                     |                    |
| L001         | EXCELSA35         | FERRITE BEAD             | Q001               | 2SD601ARTX          | TRANSISTOR         |
| J101         | EXCELSA35         | FERRITE BEAD             | Q002               | 2SC1685QRS          | TRANSISTOR         |
| L002         | ELESN390KA        | COIL, PEAKING 39UH       | Q003               | 2SB709ARTX          | TRANSISTOR         |
| L003         | TLTABT2R2K        | COIL, PEAKING 2.2UH      | Q004               | 2SB709ARTX          | TRANSISTOR         |
| L004         | TLTABT2R2K        | COIL, PEAKING 2.2UH      | Q302               | 2SD601ARTX          | TRANSISTOR         |
| L005         | ELESN390KA        | COIL, PEAKING 39UH       | Q303               | 2SB709ARTX          | TRANSISTOR         |
| L006         | EXCELSA24T        | FERRITE BEAD             | Q304               | 2SD601ARTX          | TRANSISTOR         |
| L008         | TLUABTA470K       | COIL, PEAKING 47UH       | Q351               | 2SC3063             | TRANSISTOR         |
| L009         | EXCELSA39         | FERRITE BEAD             | Q352               | 2SC3063             | TRANSISTOR         |
| L069         | EXCELSA35         | FERRITE BEAD             | Q353               | 2SC3063             | TRANSISTOR         |
| L103         | ELESN120JA        | COIL, PEAKING 12UH       | Q430               | 2SD601ARTX          | TRANSISTOR         |
| L104         | TLUABTA390K       | COIL, PEAKING 39UH       | Q451               | 2SD601ARTX          | TRANSISTOR         |
| L105         | EIV7EN053B        | COIL, VCO                | Q452               | 2SD601ARTX          | TRANSISTOR         |
| L106         | ELESN180JA        | COIL, PEAKING            | Q501               | 2SC4212H            | TRANSISTOR         |
| L351         | TLTABT101K        | COIL, PEAKING            | <b>Q551</b>        | <b>2SD2539LB306</b> | <b>TRANSISTOR</b>  |
| <b>L551</b>  | <b>ELH5L7103</b>  | <b>COIL</b>              | Q801               | 2SC1685RSTA         | TRANSISTOR         |
| L554         | EXCELSA24T        | FERRITE BEAD             | Q802               | 2SC1384RS           | TRANSISTOR         |
| L555         | EXCELSA24T        | FERRITE BEAD             | Q804               | 2SA1091-OTP2        | TRANSISTOR         |
| L556         | EXCELSA24T        | FERRITE BEAD             | Q861               | 2SC4662LF654        | TRANSISTOR         |
| <b>L801</b>  | <b>ELF20N020A</b> | <b>COIL, 2UH</b>         | Q867               | 2SD1996STA          | TRANSISTOR         |
| <b>L803</b>  | <b>ELF17N007A</b> | <b>LINE FILTER</b>       | Q871               | 2SD1996STA          | TRANSISTOR         |
| L804         | EXCELSA39         | FERRITE BEAD             | Q872               | 2SC3311RSTA         | TRANSISTOR         |
| L805         | EXCELSA39         | FERRITE BEAD             | Q873               | 2SD1996STA          | TRANSISTOR         |
| <b>L861</b>  | <b>TSKA158</b>    | <b>COIL</b>              | Q885               | 2SJ525TP            | TRANSISTOR         |
| L864         | VLP0392-T         | COIL                     | Q886               | UN4213              | TRANSISTOR         |
| L883         | TALL08T100KA      | COIL                     | Q2302              | 2SB709ARTX          | TRANSISTOR         |
| L885         | ELELN100KA        | COIL, PEAKING 10UH       | Q2303              | 2SD601ARTX          | TRANSISTOR         |
| L892         | ELESN330KA        | COIL, PEAKING 33UH       | Q2362              | 2SB709ARTX          | TRANSISTOR         |
| L894         | ELESN330KA        | COIL, PEAKING 33UH       | Q2363              | 2SD601ARTX          | TRANSISTOR         |
| L896         | TALL08T220KA      | TRANSFORMER, LINE FILTER | Q2364              | 2SB709ARTX          | TRANSISTOR         |
| L2302        | TLTABT2R2K        | COIL, PEAKING 2.2UH      | Q2409              | 2SD601ARTX          | TRANSISTOR         |
| L3001        | ELESN220KA        | COIL, PEAKING 22UH       | Q2410              | 2SD601ARTX          | TRANSISTOR         |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO.          | PART NO.        | DESCRIPTION       | REF NO. | PART NO.     | DESCRIPTION       |
|------------------|-----------------|-------------------|---------|--------------|-------------------|
| Q3601            | 2SD601ARTX      | TRANSISTOR        | R043    | ERJ6GEYJ223  | RES,M 22K-J-1/10  |
| Q3602            | 2SB709ARTX      | TRANSISTOR        | R044    | ERJ6GEYJ471  | RES,M 470-J-1/10  |
| Q3603            | 2SB1434RTA      | TRANSISTOR        | R046    | ERJ6GEYJ103  | RES,M 10K-J-1/10  |
| Q3604            | 2SB1320ARTA     | TRANSISTOR        | R048    | ERJ6GEYJ221  | RES,M 220-J-1/10  |
| Q3605            | UN2212          | TRANSISTOR        | R049    | ERJ6GEYJ221  | RES,M 220-J-1/10  |
| Q3606            | 2SB709ARTX      | TRANSISTOR        | R052    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6501            | 2SD601ARTX      | TRANSISTOR        | R053    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6502            | 2SD601ARTX      | TRANSISTOR        | R054    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6503            | 2SD601ARTX      | TRANSISTOR        | R055    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6504            | 2SD601ARTX      | TRANSISTOR        | R056    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6505            | 2SD601ARTX      | TRANSISTOR        | R057    | ERJ6GEYJ103  | RES,M 10K-J-1/10  |
| Q6506            | 2SD601ARTX      | TRANSISTOR        | R058    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6507            | 2SD601ARTX      | TRANSISTOR        | R059    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6509            | 2SD601ARTX      | TRANSISTOR        | R060    | ERJ6GEYJ102  | RES,M 1K-J-1/10   |
| Q6510            | 2SB709ARTX      | TRANSISTOR        | R061    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6516            | 2SB709ARTX      | TRANSISTOR        | R062    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6517            | 2SD601ARTX      | TRANSISTOR        | R063    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| Q6519            | 2SD601ARTX      | TRANSISTOR        | R064    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| <b>RELAYS</b>    |                 |                   | R065    | ERJ6GEYJ471  | RES,M 470-J-1/10  |
| <b>RL801</b>     | <b>TSEH8007</b> | <b>RELAY</b>      | R066    | ERJ6GEYJ222  | RES,M 2.2K-J-1/10 |
| <b>RESISTORS</b> |                 |                   | R067    | ERJ6GEYJ222  | RES,M 2.2K-J-1/10 |
| R002             | ERJ6GEYJ182     | RES,M 1.8K-J-1/10 | R068    | ERJ6GEYJ222  | RES,M 2.2K-J-1/10 |
| R003             | ERJ6GEYJ562     | RES,M 5.6K-J-1/10 | R069    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| R004             | ERDS1TJ181      | RES,C 180-J-1/2   | R070    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| R005             | ERDS2TJ101      | RES,C 100-J-1/4   | R071    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| R006             | ERJ6GEYJ102     | RES,M 1K-J-1/10   | R072    | ERJ6GEYJ560  | RES,M 56-J-1/10   |
| R007             | ERJ6GEYJ102     | RES,M 1K-J-1/10   | R080    | ER0S2CKF2201 | RES,M 2.2K-F-1/4  |
| R008             | ERJ6GEYJ562     | RES,M 5.6K-J-1/10 | R081    | ER0S2CKF2201 | RES,M 2.2K-F-1/4  |
| R009             | ERJ6GEYJ221     | RES,M 220-J-1/10  | R082    | ER0S2CKF3301 | RES,M 3.3K-F-1/4  |
| R010             | ERJ6GEYJ104     | RES,M 100K-J-1/10 | R083    | ER0S2CKF5101 | RES,M 5.1K-F-1/4  |
| R011             | ERJ6GEYJ474     | RES,M 470K-J-1/10 | R084    | ER0S2CKF9101 | RES,M 9.1K-F-1/4  |
| R012             | ERJ6GEYJ473     | RES,M 47K-J-1/10  | R085    | ER0S2CKF2202 | RES,M 22K-F-1/4   |
| R013             | ERJ6GEYJ223     | RES,M 22K-J-1/10  | R086    | ER0S2CKF1002 | RES,M 10K-F-1/4   |
| R014             | ERJ6GEYJ472     | RES,M 4.7K-J-1/10 | R087    | ER0S2CKF1002 | RES,M 10K-F-1/4   |
| R015             | ERJ6GEYJ472     | RES,M 4.7K-J-1/10 | R101    | ERJ6GEYJ750  | RES,M 75-J-1/10   |
| R016             | ERJ6GEYJ472     | RES,M 4.7K-J-1/10 | R102    | ERJ6GEYJ683  | RES,M 68K-J-1/10  |
| R017             | ERJ6GEYJ472     | RES,M 4.7K-J-1/10 | R104    | ERJ6GEYJ681  | RES,M 680-J-1/10  |
| R020             | ERJ6GEYJ474     | RES,M 470K-J-1/10 | R105    | ERJ6GEYJ681  | RES,M 680-J-1/10  |
| R021             | ERJ6GEYJ101     | RES,M 100-J-1/10  | R107    | ERJ6GEYJ471  | RES,M 470-J-1/10  |
| R022             | ERJ6GEYJ101     | RES,M 100-J-1/10  | R108    | ERJ6GEYJ222  | RES,M 2.2K-J-1/10 |
| R023             | ERJ6GEYJ102     | RES,M 1K-J-1/10   | R109    | ERJ6GEYJ183  | RES,M 18K-J-1/10  |
| R024             | ERJ6GEYJ221     | RES,M 220-J-1/10  | R152    | ERJ6GEYJ183  | RES,M 18K-J-1/10  |
| R025             | ERJ6GEYJ223     | RES,M 22K-J-1/10  | R153    | ERJ6GEYJ223  | RES,M 22K-J-1/10  |
| R026             | ERJ6GEYJ333     | RES,M 33K-J-1/10  | R154    | ERJ6GEYJ393  | RES,M 39K-J-1/10  |
| R027             | ERJ6GEYJ752     | RES,M 7.5K-J-1/10 | R201    | ERJ6GEYJ471  | RES,M 470-J-1/10  |
| R030             | ERJ6GEYJ102     | RES,M 1K-J-1/10   | R202    | ERJ6GEYJ682  | RES,M 6.8K-J-1/10 |
| R031             | ERJ6GEYJ471     | RES,M 470-J-1/10  | R203    | ERJ6GEYJ222  | RES,M 2.2K-J-1/10 |
| R034             | ERJ6GEYJ102     | RES,M 1K-J-1/10   | R303    | ERJ6GEYJ682  | RES,M 6.8K-J-1/10 |
| R038             | ERJ6GEYJ471     | RES,M 470-J-1/10  | R304    | ERJ6GEYJ332  | RES,M 3.3K-J-1/10 |
| R040             | ERJ6GEYJ223     | RES,M 22K-J-1/10  | R305    | ERJ6ENF3001  | RES,M 3K-F-1/10   |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

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| REF NO. | PART NO.    | DESCRIPTION          | REF NO.     | PART NO.           | DESCRIPTION                |
|---------|-------------|----------------------|-------------|--------------------|----------------------------|
| R306    | ERJ6ENF1651 | RES,M 1.65K-F-1/10   | R506        | ERJ6GEYJ182        | RES,M 1.8K-J-1/10          |
| R308    | ERJ6GEYJ102 | RES,M 1K-J-1/10      | R507        | ERJ6GEYJ392        | RES,M 3.9K-J-1/10          |
| R309    | ERJ6GEYJ393 | RES,M 39K-J-1/10     | R508        | ERJ6GEYJ562        | RES,M 5.6K-J-1/10          |
| R310    | ERJ6GEYJ393 | RES,M 39K-J-1/10     | R509        | ERDS2TJ331         | RES,C 330-J-1/4            |
| R311    | ERJ6GEYJ185 | RES,M 1.8MEG-J-1/10W | R510        | ERG3FJ362H         | RES,M 3.6K-J-3W            |
| R313    | ERJ6GEYJ471 | RES,M 470-J-1/10     | R511        | ERG3FJ362H         | RES,M 3.6K-J-3W            |
| R314    | ERJ6GEYJ102 | RES,M 1K-J-1/10      | R512        | ERG2FJ392H         | RES,M 3.9K-J-2W            |
| R317    | ERJ6GEYJ684 | RES,M 680K-J-1/10    | <b>R531</b> | <b>ERD25FJ470</b>  | <b>RES,C 47-J-1/4</b>      |
| R320    | ERJ6GEYJ102 | RES,M 1K-J-1/10      | <b>R532</b> | <b>ERJ6ENF6652</b> | <b>RES,M 66.5K-F-1/10</b>  |
| R351    | ERG2FJ123H  | RES,M 12K-J-2W       | <b>R533</b> | <b>ERJ6ENF2402</b> | <b>RES,M 24K-F-1/10</b>    |
| R352    | ERG2FJ123H  | RES,M 12K-J-2W       | R536        | ERJ6GEYJ223        | RES,M 22K-J-1/10           |
| R353    | ERG2FJ123H  | RES,M 12K-J-2W       | R537        | ERJ6GEYJ473        | RES,M 47K-J-1/10           |
| R354    | ERDS1TJ272  | RES,C 2.7K-J-1/2     | <b>R550</b> | <b>ERDS1FJ1R0</b>  | <b>RES,C 1.0-J-1/2</b>     |
| R355    | ERDS1TJ272  | RES,C 2.7K-J-1/2     | <b>R551</b> | <b>ERDS1FJ1R0</b>  | <b>RES,C 1.0-J-1/2</b>     |
| R356    | ERDS1TJ272  | RES,C 2.7K-J-1/2     | <b>R552</b> | <b>ERDS1FJ1R0</b>  | <b>RES,C 1.0-J-1/2</b>     |
| R357    | ERDS2TJ301  | RES,C 300-J-1/4      | R553        | ERG2FJ470H         | RES,M 47-J-2W              |
| R358    | ERDS2TJ301  | RES,C 300-J-1/4      | R556        | ERJ6GEYJ272        | RES,M 2.7K-J-1/10          |
| R359    | ERDS2TJ301  | RES,C 300-J-1/4      | R557        | ERJ6GEYJ103        | RES,M 10K-J-1/10           |
| R360    | ERDS2TJ122  | RES,C 1.2K-J-1/4     | <b>R558</b> | <b>ERQ1CKPR56</b>  | <b>RES,F .56-K-1W</b>      |
| R361    | ERDS2TJ122  | RES,C 1.2K-J-1/4     | R559        | ERG2FJ683H         | RES,M 12K-J-2W             |
| R362    | ERDS2TJ122  | RES,C 1.2K-J-1/4     | R561        | ERG2FJ102H         | RES,M 1K-J-2W              |
| R363    | ERDS2TJ101  | RES,C 100-J-1/4      | R563        | ERDS2TJ683         | RES,C 68K-J-1/4            |
| R364    | ERDS2TJ101  | RES,C 100-J-1/4      | R564        | ERDS2TJ823         | RES,C 82K-J-1/4            |
| R365    | ERDS2TJ101  | RES,C 100-J-1/4      | R565        | ERJ6GEYJ103        | RES,M 10K-J-1/10           |
| R401    | ERJ6GEYJ102 | RES,M 1K-J-1/10      | <b>R566</b> | <b>ERDS1FJ1R0</b>  | <b>RES,C 1.0-J-1/2</b>     |
| R430    | ERJ6GEYJ103 | RES,M 10K-J-1/10     | R602        | ERJ6GEYJ331        | RES,M 330-J-1/10           |
| R432    | ERJ6GEYJ102 | RES,M 1K-J-1/10      | R603        | ERJ6GEYJ331        | RES,M 330-J-1/10           |
| R451    | ERDS1FJ1R0  | RES,C 1.0-J-1/2      | R604        | ERJ6GEYJ331        | RES,M 330-J-1/10           |
| R453    | ERJ6GEYJ224 | RES,M 220K-J-1/10    | R614        | ERJ6GEYJ332        | RES,M 3.3K-J-1/10          |
| R454    | ERJ6GEYJ473 | RES,M 47K-J-1/10     | <b>R801</b> | <b>ERF7ZK1R5</b>   | <b>RES,W 1.5-K-7W</b>      |
| R455    | ERJ6GEYJ183 | RES,M 18K-J-1/10     | R804        | ERW12PK1R8         | RES,W 1.8-K-1/2W           |
| R456    | ERJ6GEYJ223 | RES,M 22K-J-1/10     | R805        | ERDS2TJ274         | RES,C 270K-J-1/4           |
| R457    | ERJ6GEYJ182 | RES,M 1.8K-J-1/10    | R806        | ERDS2TJ274         | RES,C 270K-J-1/4           |
| R458    | ERJ6GEYJ333 | RES,M 33K-J-1/10     | R808        | ERDS1FJ1R0         | RES,C 1.0-J-1/2            |
| R459    | ERJ6GEYJ683 | RES,M 68K-J-1/10     | R809        | ERDS1FJ1R0         | RES,C 1.0-J-1/2            |
| R460    | ERDS2TJ102  | RES,C 1K-J-1/4       | R810        | ERDS1FJ272         | RES,C 2.7K-J-1/2           |
| R462    | ERJ6GEYJ473 | RES,M 47K-J-1/10     | R812        | ERDS1TJ183         | RES,C 18K-J-1/2            |
| R463    | ERJ6GEYJ473 | RES,M 47K-J-1/10     | R813        | ERJ6GEYJ562        | RES,M 5.6K-J-1/10          |
| R464    | ERDS1FJ1R5  | RES,C 1.5-J-1/2      | <b>R815</b> | <b>ERD75TAJ825</b> | <b>RES,C 8.2MEG-J-3/4W</b> |
| R465    | ERJ6GEYJ103 | RES,M 10K-J-1/10     | <b>R818</b> | <b>ERQ12HKR56</b>  | <b>RES,F .56-K-1/2</b>     |
| R466    | ERJ6GEYJ103 | RES,M 10K-J-1/10     | R822        | ERD50FJ474         | RES,C 470K-J-1/2W          |
| R467    | ERJ6GEYJ104 | RES,M 100K-J-1/10    | R823        | ERDS2TJ222         | RES,C 2.2K-J-1/4           |
| R468    | ERJ6GEYJ101 | RES,M 100-J-1/10     | R824        | ERG5FJ390H         | RES,M 39K-J-5W             |
| R469    | ERJ6GEYJ220 | RES,M 22-J-1/10      | R825        | ERDS2TJ102         | RES,C 1K-J-1/4             |
| R471    | ERJ6GEYJ223 | RES,M 22K-J-1/10     | <b>R826</b> | <b>ERF2AKR22</b>   | <b>RES,W .22-K-2W</b>      |
| R501    | ERJ6GEYJ102 | RES,M 1K-J-1/10      | R827        | ERDS1FJ561         | RES,C 560-J-1/2            |
| R502    | ERJ6GEYJ562 | RES,M 5.6K-J-1/10    | R828        | ERG5FJ470          | RES,M 47K-J-5W             |
| R503    | ERJ6GEYJ822 | RES,M 8.2K-J-1/10    | R829        | ERQ14AJ6R8         | RES,F 6.8-J-1/4            |
| R504    | ERJ6GEYJ561 | RES,M 560-J-1/10     | R862        | ERDS2FJ124         | RES,C 124K-J-1/4           |
| R505    | ERJ6GEYJ682 | RES,M 6.8K-J-1/10    | R863        | ERDS2FJ124         | RES,C 124K-J-1/4           |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

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| REF NO. | PART NO.     | DESCRIPTION        | REF NO. | PART NO.    | DESCRIPTION         |
|---------|--------------|--------------------|---------|-------------|---------------------|
| R864    | ERDS2TJ105   | RES,C 1MEG-J-1/4   | R2334   | ERJ6GEYJ682 | RES,M 6.8K-J-1/10   |
| R865    | ERG3SJ680H   | RES,M 68K-J-3W     | R2336   | ERJ6GEYJ105 | RES,M 1.0MEG-J-1/10 |
| R866    | ERDS2TJ750   | RES,C 75-J-1/4     | R2337   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R867    | ERDS2TJ100   | RES,C 10-J-1/4     | R2338   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R868    | ERDS2TJ331   | RES,C 330-J-1/4    | R2339   | ERJ6GEYJ105 | RES,M 1.0MEG-J-1/10 |
| R869    | ER0S2CKG6800 | RES,M 680K-F-1/4W  | R2340   | ERJ6GEYJ223 | RES,M 22K-J-1/10    |
| R871    | ERDS2TJ103   | RES,C 10K-J-1/4    | R2341   | ERJ6GEYJ152 | RES,M 1.5K-J-1/10   |
| R872    | ERDS2TJ514   | RES,C 510K-J-1/4   | R2342   | ERJ6GEYJ223 | RES,M 22K-J-1/10    |
| R873    | ERDS2TJ474   | RES,C 470K-J-1/4   | R2343   | ERJ6GEYJ152 | RES,M 1.5K-J-1/10   |
| R874    | ERDS2TJ153   | RES,C 15K-J-1/4    | R2352   | ERJ6GEYJ105 | RES,M 1.0MEG-J-1/10 |
| R875    | ERDS2TJ332   | RES,C 3.3K-J-1/4   | R2357   | ERJ6GEYJ221 | RES,M 220-J-1/10    |
| R876    | ERDS2TJ473   | RES,C 47K-J-1/4    | R2359   | ERJ6GEYJ105 | RES,M 1.0MEG-J-1/10 |
| R881    | ER0S2CKF75R0 | RES,M 75-F-1/4     | R2361   | ERJ6GEYJ221 | RES,M 220-J-1/10    |
| R882    | ER0S2CKF1201 | RES,M 1.2K-F-1/4W  | R2362   | ERJ6GEYJ103 | RES,M 10K-J-1/10    |
| R883    | ER0S2CKF1201 | RES,M 1.2K-F-1/4W  | R2363   | ERJ6GEYJ471 | RES,M 470-J-1/10    |
| R884    | ERDS2TJ561   | RES,C 560-J-1/4    | R2366   | ERDS2TJ222  | RES,C 2.2K-J-1/4    |
| R885    | ERDS2TJ271   | RES,C 270-J-1/4    | R2367   | ERDS2TJ222  | RES,C 2.2K-J-1/4    |
| R886    | ERDS2TJ392   | RES,C 3.9K-J-1/4   | R2368   | ERJ6GEYJ223 | RES,M 22K-J-1/10    |
| R887    | ERDS2TJ472   | RES,C 4.7K-J-1/4   | R2418   | ERJ6GEYJ471 | RES,M 470-J-1/10    |
| R888    | ERDS2TJ104   | RES,C 100K-J-1/4   | R2419   | ERJ6GEYJ471 | RES,M 470-J-1/10    |
| R889    | ERDS2TJ102   | RES,C 1K-J-1/4     | R3011   | ERJ6GEYJ750 | RES,M 75-J-1/10     |
| R891    | ERDS2TJ101   | RES,C 100-J-1/4    | R3012   | ERJ6GEYJ331 | RES,M 330-J-1/10    |
| R892    | ER0S2CKF1201 | RES,M 1.2K-F-1/4W  | R3013   | ERDS2TJ682  | RES,C 6.8K-J-1/4    |
| R893    | ER0S2CKF1201 | RES,M 1.2K-F-1/4W  | R3014   | ERDS2TJ682  | RES,C 6.8K-J-1/4    |
| R894    | ERDS2TJ101   | RES,C 100-J-1/4    | R3017   | ERJ6GEYJ750 | RES,M 75-J-1/10     |
| R1065   | ER0S2CKF2261 | RES,M 2.26K-F-1/4W | R3019   | ERJ6GEYJ750 | RES,M 75-J-1/10     |
| R1066   | ER0S2CKF2261 | RES,M 2.26K-F-1/4W | R3021   | ERDS2TJ682  | RES,C 6.8K-J-1/4    |
| R1067   | ER0S2CKF3301 | RES,M 3.3K-F-1/4   | R3026   | ERDS2TJ331  | RES,C 330-J-1/4     |
| R1068   | ER0S2CKF5101 | RES,M 5.1K-F-1/4   | R3028   | ERDS2TJ682  | RES,C 6.8K-J-1/4    |
| R1069   | ER0S2CKF9101 | RES,M 9.1K-F-1/4W  | R3033   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R1070   | ER0S2CKF2152 | RES,M 21.5K-F-1/4W | R3034   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2201   | ERJ6GEYJ224  | RES,M 220K-J-1/10  | R3041   | ERDS2TJ102  | RES,C 1K-J-1/4      |
| R2206   | ERJ6GEYJ102  | RES,M 1K-J-1/10    | R3042   | ERDS2TJ102  | RES,C 1K-J-1/4      |
| R2207   | ERJ6GEYJ102  | RES,M 1K-J-1/10    | R3043   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2220   | ERJ6GEYJ101  | RES,M 100-J-1/10   | R3044   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2301   | ERQ2CJP1R0   | RES,F 1.0-J-2W     | R3045   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2305   | ERD25FJ180   | RES,C 18-J-1/4     | R3046   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2306   | ERD25FJ180   | RES,C 18-J-1/4     | R3047   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2307   | ERJ6GEYJ221  | RES,M 220-J-1/10   | R3048   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2308   | ERJ6GEYJ221  | RES,M 220-J-1/10   | R3051   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2311   | ERJ6GEYJ392  | RES,M 3.9K-J-1/10  | R3052   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2312   | ERJ6GEYJ822  | RES,M 8.2K-J-1/10  | R3053   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2318   | ERJ6GEYJ682  | RES,M 6.8K-J-1/10  | R3054   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2319   | ERJ6GEYJ223  | RES,M 22K-J-1/10   | R3321   | ERDS2TJ181  | RES,C 180-J-1/4     |
| R2323   | ERJ6GEYJ333  | RES,M 33K-J-1/10   | R3322   | ERDS2TJ181  | RES,C 180-J-1/4     |
| R2325   | ERJ6GEYJ682  | RES,M 6.8K-J-1/10  | R3501   | ERJ6GEYJ562 | RES,M 5.6K-J-1/10   |
| R2329   | ERJ6GEYJ751  | RES,M 750-J-1/10   | R3502   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2330   | ERJ6GEYJ153  | RES,M 15K-J-1/10   | R3503   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2332   | ERJ6GEYJ751  | RES,M 750-J-1/10   | R3504   | ERJ6GEYJ101 | RES,M 100-J-1/10    |
| R2333   | ERJ6GEYJ153  | RES,M 15K-J-1/10   | R3505   | ERJ6GEYJ560 | RES,M 56-J-1/10     |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO. | PART NO.    | DESCRIPTION        | REF NO. | PART NO.    | DESCRIPTION       |
|---------|-------------|--------------------|---------|-------------|-------------------|
| R3506   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R4593   | ERJ6GEYJ103 | RES,M 10K-J-1/10  |
| R3507   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R4594   | ERJ6GEYJ333 | RES,M 33K-J-1/10  |
| R3508   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R4595   | ERJ6GEYJ101 | RES,M 100-J-1/10  |
| R3509   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R4596   | ERJ6GEYJ101 | RES,M 100-J-1/10  |
| R3510   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6501   | ERJ6GEYJ471 | RES,M 470-J-1/10  |
| R3511   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6502   | ERJ6GEYJ471 | RES,M 470-J-1/10  |
| R3512   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6503   | ERJ6GEYJ103 | RES,M 10K-J-1/10  |
| R3513   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6504   | ERJ6GEYJ103 | RES,M 10K-J-1/10  |
| R3514   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6505   | ERJ6GEYJ471 | RES,M 470-J-1/10  |
| R3515   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6506   | ERJ6GEYJ471 | RES,M 470-J-1/10  |
| R3520   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6507   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3521   | ERJ6GEYJ473 | RES,M 47K-J-1/10   | R6508   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3522   | ERJ6GEYJ473 | RES,M 47K-J-1/10   | R6509   | ERJ6GEYJ471 | RES,M 470-J-1/10  |
| R3523   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6510   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3601   | ERJ6GEYJ331 | RES,M 330-J-1/10   | R6511   | ERJ6GEYJ123 | RES,M 12K-J-1/10  |
| R3602   | ERJ6GEYJ103 | RES,M 10K-J-1/10   | R6512   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3603   | ERJ6GEYJ333 | RES,M 33K-J-1/10   | R6513   | ERJ6GEYJ152 | RES,M 1.5K-J-1/10 |
| R3604   | ERJ6GEYJ822 | RES,M 8.2K-J-1/10  | R6515   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3605   | ERJ6GEYJ152 | RES,M 1.5K-J-1/10  | R6516   | ERJ6GEYJ103 | RES,M 10K-J-1/10  |
| R3606   | ERJ6GEYJ822 | RES,M 8.2K-J-1/10  | R6517   | ERJ6GEYJ562 | RES,M 5.6K-J-1/10 |
| R3607   | ERJ6GEYJ822 | RES,M 8.2K-J-1/10  | R6518   | ERJ6GEYJ333 | RES,M 33K-J-1/10  |
| R3608   | ERJ6GEYJ103 | RES,M 10K-J-1/10   | R6519   | ERJ6GEYJ333 | RES,M 33K-J-1/10  |
| R3609   | ERJ6GEYJ103 | RES,M 10K-J-1/10   | R6520   | ERJ6GEYJ511 | RES,M 510-J-1/10W |
| R3610   | ERJ6GEYJ822 | RES,M 8.2K-J-1/10  | R6521   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3611   | ERJ6GEYJ473 | RES,M 47K-J-1/10   | R6522   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3612   | ERJ6GEYJ473 | RES,M 47K-J-1/10   | R6523   | ERJ6GEYJ562 | RES,M 5.6K-J-1/10 |
| R3613   | ERJ6GEYJ821 | RES,M 820-J-1/10   | R6524   | ERJ6GEYJ471 | RES,M 470-J-1/10  |
| R3614   | ERJ6GEYJ821 | RES,M 820-J-1/10   | R6526   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3617   | ERJ6GEYJ104 | RES,M 100K-J-1/10  | R6529   | ERJ6GEYJ223 | RES,M 22K-J-1/10  |
| R3618   | ERJ6GEYJ104 | RES,M 100K-J-1/10  | R6530   | ERJ6GEYJ223 | RES,M 22K-J-1/10  |
| R3619   | ERJ6GEYJ392 | RES,M 3.9K-J-1/10  | R6535   | ERJ6GEYJ181 | RES,M 180-J-1/10  |
| R3620   | ERJ6GEYJ392 | RES,M 3.9K-J-1/10  | R6537   | ERJ6GEYJ392 | RES,M 3.9K-J-1/10 |
| R3621   | ERJ6GEYJ472 | RES,M 4.7K-J-1/10  | R6538   | ERJ6GEYJ122 | RES,M 1.2K-J-1/10 |
| R3624   | ERJ6ENF75R0 | RES,M 75.0-F-1/10W | R6540   | ERJ6GEYJ151 | RES,M 150-J-1/10  |
| R3625   | ERJ6ENF75R0 | RES,M 75.0-F-1/10W | R6542   | ERJ6GEYJ680 | RES,M 68-J-1/10   |
| R3626   | ERJ6GEYJ103 | RES,M 10K-J-1/10   | R6543   | ERJ6GEYJ122 | RES,M 1.2K-J-1/10 |
| R3627   | ERJ6GEYJ103 | RES,M 10K-J-1/10   | R6545   | ERJ6GEYJ221 | RES,M 220-J-1/10  |
| R3628   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6549   | ERJ6GEYJ222 | RES,M 2.2K-J-1/10 |
| R3629   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6552   | ERJ6GEYJ101 | RES,M 100-J-1/10  |
| R3630   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6553   | ERJ6GEYJ101 | RES,M 100-J-1/10  |
| R3631   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6554   | ERJ6GEYJ472 | RES,M 4.7K-J-1/10 |
| R3632   | ERJ6GEYJ221 | RES,M 220-J-1/10   | R6555   | ERJ6GEYJ153 | RES,M 15K-J-1/10  |
| R3633   | ERJ6GEYJ221 | RES,M 220-J-1/10   | R6556   | ERJ6GEYJ333 | RES,M 33K-J-1/10  |
| R3634   | ERJ6GEYJ101 | RES,M 100-J-1/10   | R6557   | ERJ6GEYJ123 | RES,M 12K-J-1/10  |
| R3635   | ERJ6GEYJ471 | RES,M 470-J-1/10   | R6558   | ERJ6GEYJ331 | RES,M 330-J-1/10  |
| R3637   | ERJ6GEYJ472 | RES,M 4.7K-J-1/10  | R6559   | ERJ6GEYJ272 | RES,M 2.7K-J-1/10 |
| R3640   | ERJ6GEYJ223 | RES,M 22K-J-1/10   | R6560   | ERJ6GEYJ124 | RES,M 120K-J-1/10 |
| R3641   | ERJ6GEYJ121 | RES,M 120-J-1/10   | R6565   | ERJ6GEYJ102 | RES,M 1K-J-1/10   |
| R3642   | ERJ6GEYJ271 | RES,M 270-J-1/10   | R6566   | ERJ6GEYJ681 | RES,M 680-J-1/10  |

# REPLACEMENT PARTS LIST

Model: CT-27DC50B

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

| REF NO.                 | PART NO.            | DESCRIPTION                             | REF NO.       | PART NO.            | DESCRIPTION                   |
|-------------------------|---------------------|-----------------------------------------|---------------|---------------------|-------------------------------|
| R6567                   | ERJ6GEYJ222         | RES,M 2.2K-J-1/10                       | X601          | TSS2AA001           | CRYSTAL, 3.58MHZ              |
| R6568                   | ERJ6GEYJ471         | RES,M 470-J-1/10                        | <b>OTHERS</b> |                     |                               |
| R6570                   | ERJ6GEYJ103         | RES,M 10K-J-1/10                        | M001          | ETC33X82NA          | CY                            |
| <b>SWITCHES</b>         |                     |                                         | <b>TNR001</b> | <b>ENV56D37G3R</b>  | <b>TUNER</b>                  |
| S010                    | EVQPB05R            | SWITCH                                  | M002          | EUR511503           | TRANSMITTER, REMOTE CONTROL   |
| S011                    | EVQPB05R            | SWITCH                                  | M003          | UR51EC975A          | BATTERY COVER, REMOTE CONTROL |
| S012                    | EVQPB05R            | SWITCH                                  | M004          | <b>KRCBC160928B</b> | <b>FERRITE</b>                |
| S013                    | EVQPB05R            | SWITCH                                  | M005          | <b>M68LGL061X</b>   | <b>CRT</b>                    |
| S014                    | EVQPB05R            | SWITCH                                  | M006          | TAS2AA0015          | SPEAKER 8-OHM 5W              |
| S015                    | EVQPB05R            | SWITCH                                  | M007          | TBM2A10143          | BADGE, PANASONIC              |
| S016                    | EVQPB05R            | SWITCH                                  | M008          | TXFBX15BSER         | ASSY, 13-KEY BUTTON           |
| S020                    | EVQPB05R            | SWITCH                                  | <b>M009</b>   | <b>TJS2AC00301</b>  | <b>CRT SOCKET</b>             |
| S021                    | EVQPB05R            | SWITCH                                  | M010          | TKP2AA0292S         | PANEL TRAY                    |
| S022                    | EVQPB05R            | SWITCH                                  | M011          | TKU2AC1501S         | ASSY, CABINET BACK            |
| S023                    | EVQPB05R            | SWITCH                                  | M012          | TKX2AA0071          | IR GUIDE                      |
| S024                    | EVQPB05R            | SWITCH                                  | M013          | TKX2AA0081          | IR HOLDER                     |
| S025                    | EVQPB05R            | SWITCH                                  | M014          | TKY2AA1702S         | ASSY, CABINET FRONT           |
| <b>TRANSFORMERS</b>     |                     |                                         | <b>DY</b>     | <b>TLY2AA006</b>    | <b>DEFLECTION YOKE</b>        |
| <b>T001</b>             | <b>TLP16297</b>     | <b>TRANSFORMER, POWER SUPPLY</b>        | M015          | TMX2AE0051          | CHASSIS RAIL (R)              |
| <b>T501</b>             | <b>TLH15452</b>     | <b>TRANSFORMER, HORIZONTAL DRIVER</b>   | M016          | TMX2AE0052          | CHASSIS RAIL (L)              |
| <b>T502</b>             | <b>ETE19Z30AY</b>   | <b>TRANSFORMER, HORIZONTAL COUPLING</b> | M017          | TMW2AX006           | DVD BRACKET                   |
| <b>T551</b>             | <b>KFT4AB143F</b>   | <b>TRANSFORMER, FLYBACK</b>             | M018          | TNAX007S            | ASSY, DVD UNIT                |
| <b>T801</b>             | <b>ETS29AK3L5NC</b> | <b>TRANSFORMER, SWITCHING</b>           | M019          | TQB2AA0339          | MANUAL, OWNERS                |
| <b>T861</b>             | <b>ETS28AV115AC</b> | <b>TRANSFORMER</b>                      | M020          | TSXL136             | FLAT CABLE                    |
| <b>CRYSTALS/FILTERS</b> |                     |                                         | M021          | TSX2AA0251          | LINE CORD                     |
| X001                    | TSSA010             | CRYSTAL                                 | M022          | TXF3A01ADR          | CRT GROUND LEAD WIRE ASSEMBLY |
| X101                    | M1969M              | SAW FILTER                              | M023          | 0FMK014ZZ           | CONVERGENCE CORRECTOR STRIP   |
| X102                    | EFCS4R5MW5BA        | FILTER, BANDPASS                        | <b>DEG</b>    | <b>0LK19045A</b>    | <b>DEGAUSSING COIL</b>        |
| X201                    | SFSH4R5MDB          | CRYSTAL                                 | D3331         | GP1F32T             | AUDIO OUTPUT                  |
| X501                    | TAFCSB503F38        | CRYSTAL, CLOCK                          | JK3001        | TJB2AA0181          | TERMINAL, A/V                 |
|                         |                     |                                         | JK3002        | TJB2AA0046          | TERMINAL, FRONT A/V           |
|                         |                     |                                         | JK3003        | TJB2AA0171          | TERMINAL, S-VHS               |

## DESCRIPTION OF ABBREVIATIONS GUIDE

| RESISTOR |             |           |       |
|----------|-------------|-----------|-------|
| TYPE     |             | TOLERANCE |       |
| C        | Carbon      | F         | ± 1%  |
| F        | Fuse        | J         | ± 5%  |
| M        | Metal Oxide | K         | ± 10% |
| S        | Solid       | M         | ± 20% |
| W        | Wire Wound  | G         | ± 2%  |

**RES, C 270-J-1/4**

| CAPACITOR |              |           |           |
|-----------|--------------|-----------|-----------|
| TYPE      |              | TOLERANCE |           |
| C         | Ceramic      | C         | ± 0.25pF  |
| E         | Electrolytic | D         | ± 0.5pF   |
| P         | Polyester    | F         | ± 1pF     |
| S         | Styrol       | J         | ± 5%      |
| T         | Tantalum     | K         | ± 10%     |
|           |              | L         | ± 15%     |
|           |              | M         | ± 20%     |
|           |              | P         | +10% -0%  |
|           |              | Z         | +80% -20% |

**CAP, P .068UF-K-50V**

# SERVICEMAN MODE (ELECTRONIC CONTROL) SERVICE ADJUSTMENT VALUES

Model \_\_\_\_\_ Ser # \_\_\_\_\_ Date \_\_\_\_\_

**Note: Record the original settings PRIOR to modifying the registers.**

| Mode                | Service Adjustment    | Adjustment Range | Def. Val. | Original Value | New Value |
|---------------------|-----------------------|------------------|-----------|----------------|-----------|
| Sub Adjustments     |                       |                  |           |                |           |
| B0                  | SUB-COLOR             | 0 ~ 63           | 33        |                |           |
| B1                  | SUB-TINT              | 0 ~ 63           | 33        |                |           |
| B2                  | SUB-BRIGHTNESS        | 0 ~ 255          | 80        |                |           |
| B3                  | SUB-PICTURE           | 0 ~ 63           | 34        |                |           |
| B4*                 | KILLER/ABL/GAMMA      | 0 ~ 7            | 5         |                |           |
| B5                  | VIDEO ADJUSTMENT      | 0 ~ 15           | 8         |                |           |
| B6                  | AUDIO ADJUSTMENT      | 0 ~ 31           | 16        |                |           |
| B7                  | V-SIZE                | 0 ~ 63           | 29        |                |           |
| B8                  | S V-SIZE              | 0 ~ 63           | 12        |                |           |
| Cut-Off Adjustments |                       |                  |           |                |           |
| C0                  | CUT-OFF R             | 0 ~ 1<br>0 ~ 255 | 0<br>128  |                |           |
| C1                  | CUT-OFF G             | 0 ~ 255          | 64        |                |           |
| C2                  | CUT-OFF B             | 0 ~ 1<br>0 ~ 255 | 0<br>128  |                |           |
| C3                  | DRIVE R               | 0 ~ 127          | 64        |                |           |
| C4                  | DRIVE B               | 0 ~ 127          | 64        |                |           |
| C5                  | YNR SWITCH            | 0 ~ 1            | 0         |                |           |
| C6                  | AFT                   | 0 ~ 1<br>0 ~ 128 | 1<br>120  |                |           |
| C7                  | RF-AGC                | 0 ~ 127          | 64        |                |           |
| C8                  | YNR VIDEO ADJUSTMENT  | 0 ~ 7            | 0         |                |           |
| C9                  | HORIZONTAL CENTER     | 0 ~ 31           | 11        |                |           |
| Ca                  | BEAM LIMIT            | 0 ~ 7            | 4         |                |           |
| Cb*                 | VCJ TEST H            | 0 ~ 2            | 0         |                |           |
| MTS Adjustments     |                       |                  |           |                |           |
| M0                  | INPUT LEVEL           | 0 ~ 63           | 33        |                |           |
| M1                  | HIGH-LEVEL SEPARATION | 0 ~ 63           | 25        |                |           |
| M2                  | LOW-LEVEL SEPARATION  | 0 ~ 16           | 6         |                |           |

| Mode                    | Service Adjustment    | Adjustment Range | Def. Val. | Original Value | New Value |
|-------------------------|-----------------------|------------------|-----------|----------------|-----------|
| Options Adjustments     |                       |                  |           |                |           |
| S0                      | PIP COLOR             | 0 ~ 127          | 80        |                |           |
| S1                      | PIP CONTRAST          | 0 ~ 127          | 52        |                |           |
| S2*                     | UP 1/9                | 0 ~ 255          | 26        |                |           |
| S3*                     | DOWN 1/9              | 0 ~ 255          | 146       |                |           |
| S4*                     | LEFT 1/9              | 0 ~ 255          | 9         |                |           |
| S5*                     | RIGH 1/9              | 0 ~ 255          | 103       |                |           |
| S6*                     | UP 1/16               | 0 ~ 255          | 27        |                |           |
| S7*                     | DOWN 1/16             | 0 ~ 255          | 163       |                |           |
| S8*                     | LEFT 1/16             | 0 ~ 255          | 9         |                |           |
| S9*                     | RIGH 1/16             | 0 ~ 255          | 118       |                |           |
| Sa                      | FREERUN               | N/A              | N/A       |                |           |
| Sb                      | CLOCK ADJUSTMENT      | 0 ~ 255          | 128       |                |           |
| Sc                      | PIP TINT              | 0 ~ 63           | 50        |                |           |
| Sd                      | LOUDNESS COMPENSATION | 0 ~ 63           | 52        |                |           |
| Comb Filter Adjustments |                       |                  |           |                |           |
| X0*                     | COMB GAIN             | 0 ~ 255          | 152       |                |           |
| X1*                     | COMB SWITCH           | 0 ~ 63           | 12        |                |           |
| X2*                     | COMB LIMIT            | 0 ~ 63           | 24        |                |           |
| X3*                     | COMB CORE             | 0 ~ 127          | 41        |                |           |
| X4*                     | COMB RF DELAY         | 0 ~ 127          | 20        |                |           |
| X5*                     | COMB VIDEO DELAY      | 0 ~ 127          | 18        |                |           |
| X6*                     | COMB VMLM             | 0 ~ 127          | 90        |                |           |
| X7*                     | COMB VM SW            | 0 ~ 63           | 24        |                |           |
| X8*                     | COMB SHARP            | 0 ~ 255          | 30        |                |           |
| X9*                     | COMB VM LEVEL         | 0 ~ 255          | 255       |                |           |
| Xa*                     | COMB VMPKF            | 0 ~ 1            | 01        |                |           |
| Xb*                     | COMB ADJ SHARP        | 0 ~ 63           | 15        |                |           |

**\*NOTE**

This registers are preset at the factory, should not be changed.

A

B

C

D

E

F

G

H

## A-Board Schematic (Left Portion)

TNPH0353

A

1

2

3

4

5

MTNC000522C1

Sheet 1 of 3  
Side AA-Board Schematic  
(Left portion)

CT-27DC50B

## Boards Designation

- A-Board - Main Chassis
- C-Board - CRT Drive
- G-Board - Front Video Input
- JJ-Board - A/V Amp Interface
- K-Board - Customer Controls
- M-Board - DVD-TV CPU Interface
- P-Board - DVD Power Supply
- W-Board - DVD Unit Interface

## Voltage Measurements

- Voltage measurement:
  - AC input to the Receiver is 120V. NTSC (40, 1125 & 525P) when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black).
  - All Picture and Audio adjustments are set to Normalize.
  - TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
  - Volume - Min
  - TV/Video SW - TV position
  - Audio Mode - Stereo

Voltage readings are nominal and may vary  $\pm 10\%$  on active devices. Some voltage reading will vary with signal strength and picture content.

Supply voltages are nominal.

Ground symbol  $\downarrow$  indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

**CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.**

## Schematic Notes

- Resistors are carbon 1/4W unless noted otherwise.
- Capacitors are ceramic 50V unless noted otherwise.
- Coil value notes is inductance in  $\mu$ H.
- Test point indicated by  $\uparrow$ ; Test point but no pin  $\uparrow$ .
- Components indicated with  $\Delta$  are critical parts and replacement should be made with manufacture specified replacement parts only.
- (BOLD LINE)** indicates the route of B+ supply.
- The schematic diagrams are current at the time of printing and are subject to change without notice.
- Ground symbol  $\downarrow$  indicates **HOT GROUND CONNECTION**;  $\uparrow$  indicates COLD GROUND.

**NOTE:** All other component symbols are used for engineering design purposes.

## Waveform Measurements

- Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
- Taken with an NTSC signal generator connected to the antenna terminal. NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.
- Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
- All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
- Ground symbol  $\downarrow$  shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

**CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.**

## IMPORTANT SAFETY NOTICE

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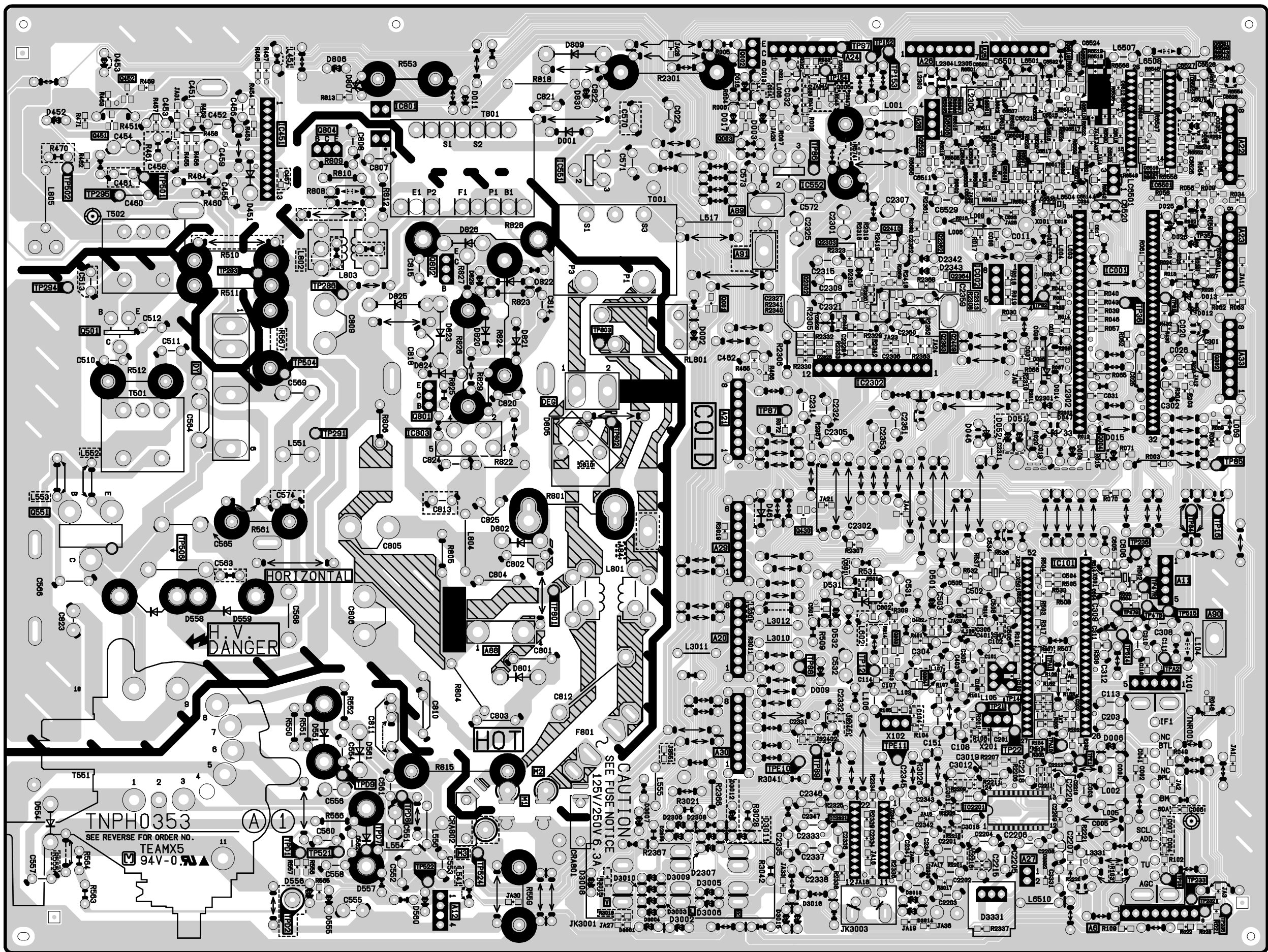
## Notes:

Check Parts List for most recent component values and part numbers.

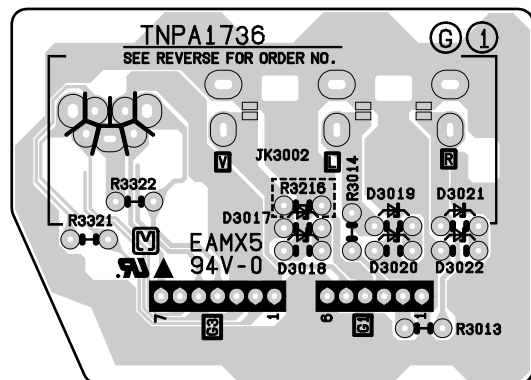
Obtain voltages with a digital multimeter.

Overlapping Section  
See Sheet 2 Side A for Right Portion of Schematic

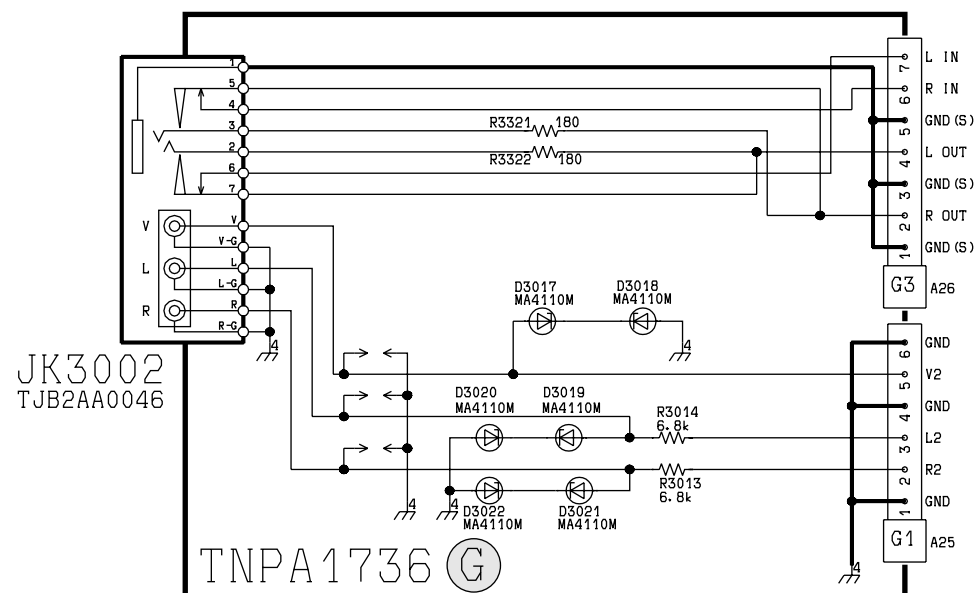
A-Board Layout  
TNPH0353



G-Board Layout  
TNPA1736



G-Board Schematic



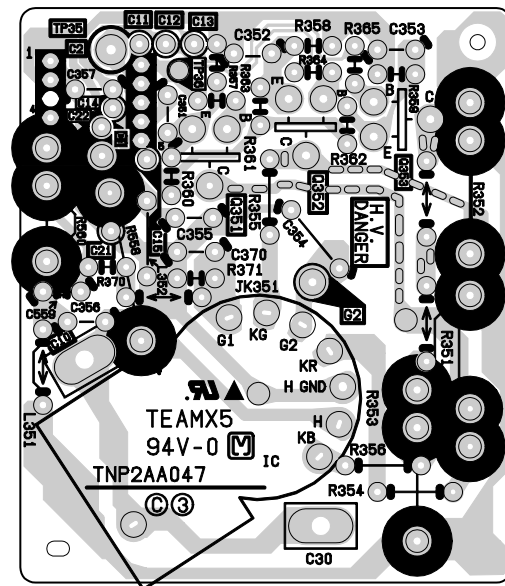
Notes:

The above boards have been modified to enhance and display traces otherwise hidden by a mask.

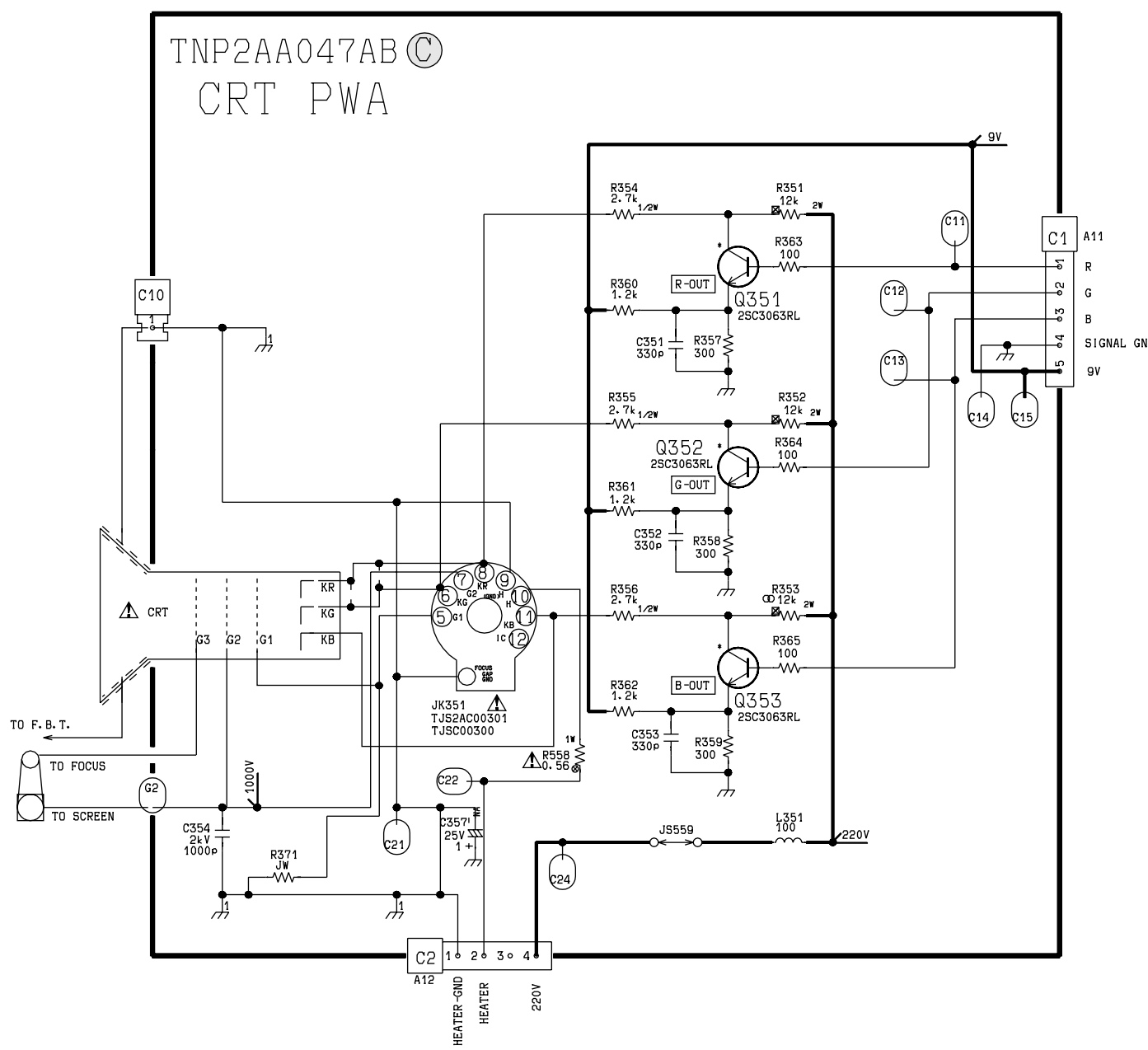
Check Parts List for most recent component values and part numbers.

Obtain voltages with a digital multimeter.

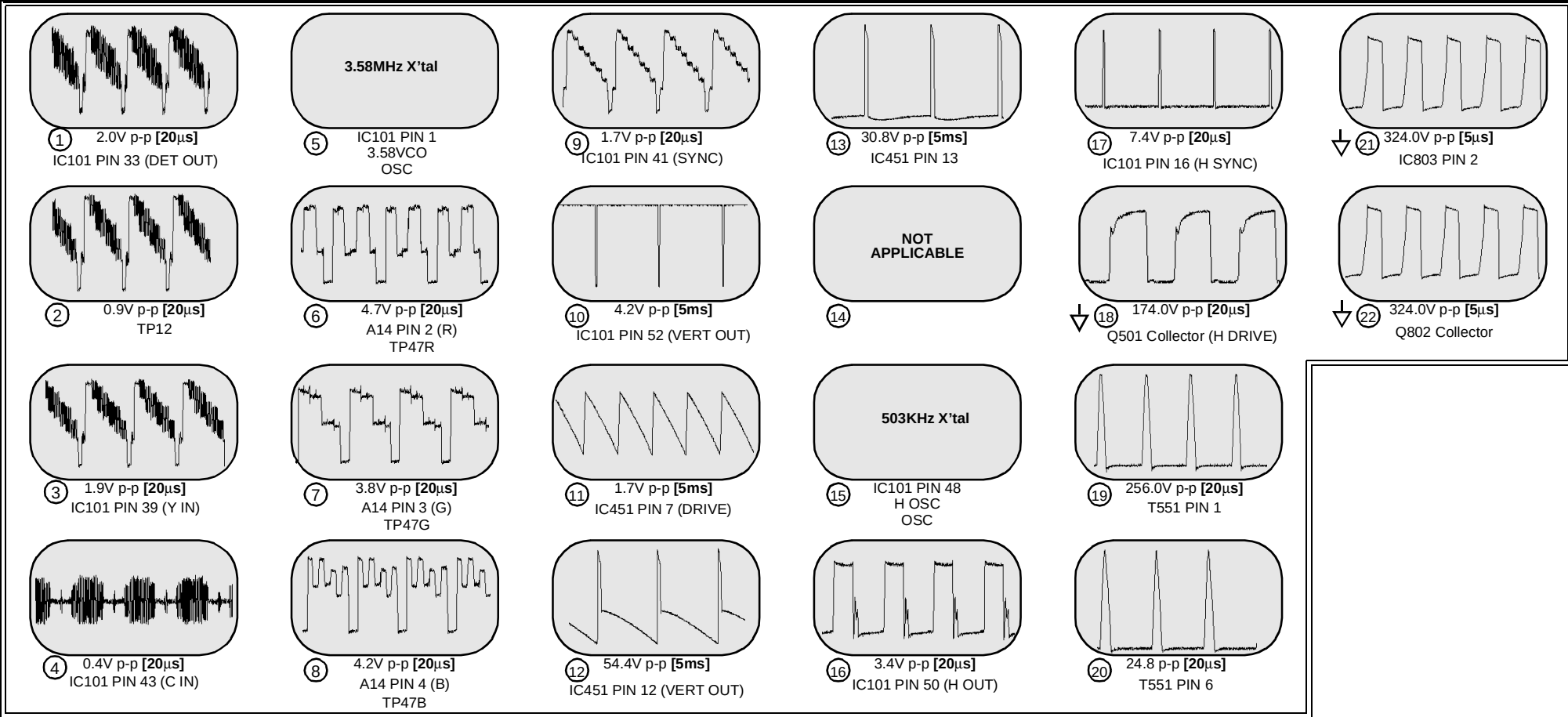
C-Board Layout  
TNP2AA047



C-Board Schematic



Waveforms - A-Board



Boards Designation

- A-Board - Main Chassis
- C-Board - CRT Drive
- G-Board - Front Video Input
- JJ-Board - A/V Amp Interface
- K-Board - Customer Controls
- M-Board - DVD-TV CPU Interface
- P-Board - DVD Power Supply
- W-Board - DVD Unit Interface

C-Board Voltages

|   | Q351   | Q352   | Q353   |
|---|--------|--------|--------|
| B | 3.26   | 3.26   | 3.32   |
| C | 170.00 | 169.10 | 165.70 |
| E | 3.00   | 2.95   | 3.02   |

Waveform Measurements

- Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
- Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
- Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
- All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
- Ground symbol  $\downarrow$  shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

Voltage Measurements

- Voltage measurement:
  - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
  - All Picture and Audio adjustments are set to Normalize. TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
  - Volume - Min
  - TV/Video SW - TV position
  - Audio Mode - Stereo

Voltage readings are nominal and may vary  $\pm 10\%$  on active devices. Some voltage reading will vary with signal strength and picture content. Supply voltages are nominal. Ground symbol  $\downarrow$  indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

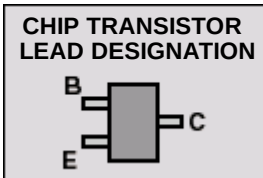
Schematic Notes

- Resistors are carbon 1/4W unless noted otherwise.
- Capacitors are ceramic 50V unless noted otherwise.
- Coil value notes is inductance in  $\mu\text{H}$ .
- Test point indicated by  $\uparrow$ : Test point but no pin  $\uparrow$ .
- Components indicated with  $\Delta$  are critical parts and replacement should be made with manufacture specified replacement parts only.
- (BOLD LINE)** indicates the route of B+ supply.
- The schematic diagrams are current at the time of printing and are subject to change without notice.
- Ground symbol  $\downarrow$  indicates **HOT GROUND CONNECTION**;  $\uparrow$  indicates **COLD GROUND**.

NOTE: All other component symbols are used for engineering design purposes.

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See Sheet 1 Side A for Left Portion of Schematic

A

B

C

D

E

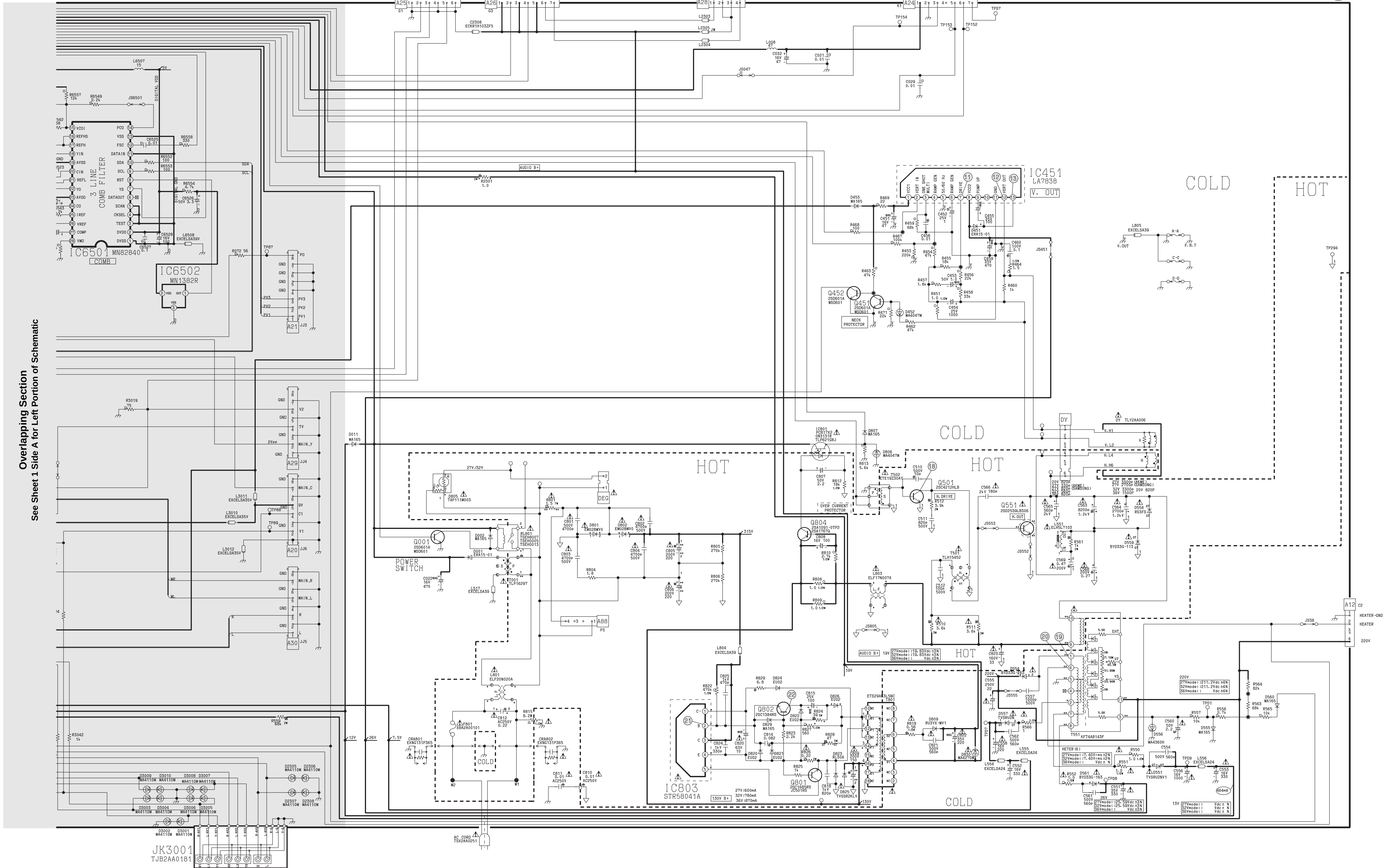
F

G

H

## A-Board Schematic (Right Portion)

TNP0353A



## 5 Boards Designation

- A-Board - Main Chassis
- C-Board - CRT Drive
- G-Board - Front Video Input
- JJ-Board - A/V Amp Interface
- K-Board - Customer Controls
- M-Board - DVD-TV CPU Interface
- P-Board - DVD Power Supply
- W-Board - DVD Unit Interface

## Voltage Measurements

- Voltage measurement:
    - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black).
    - All Picture and Audio adjustments are set to Normalize.
    - TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
    - Volume - Min.
    - TV/Video SW - TV position
    - Audio Mode - Stereo
  - Ground symbol  $\downarrow$  indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.
- CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.**

## Schematic Notes

- Resistors are carbon 1/4W unless noted otherwise.
  - Capacitors are ceramic 50V unless noted otherwise.
  - Coil value notes is inductance in  $\mu$ H.
  - Test point indicated by  $\uparrow$ ; Test point but no pin  $\uparrow$ .
  - Components indicated with  $\Delta$  are critical parts and replacement should be made with manufacture specified replacement parts only.
  - (BOLD LINE)** indicates the route of B+ supply.
  - The schematic diagrams are current at the time of printing and are subject to change without notice.
  - Ground symbol  $\downarrow$  indicates **HOT** GROUND CONNECTION.  $\Delta$  indicates COLD GROUND.
- NOTE: All other component symbols are used for engineering design purposes.**

## Waveform Measurements

- Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
  - Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black).
  - Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
  - All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
  - Ground symbol  $\downarrow$  shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.
- CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.**

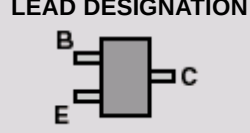
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## Notes:

Check Parts List for most recent component values and part numbers. Obtain voltages with a digital multimeter.

## CHIP TRANSISTOR LEAD DESIGNATION



## A-Board Voltage Measurements

## (ICs and Transistors)

| IC001 |      |    |      | IC101 |      |    |      |
|-------|------|----|------|-------|------|----|------|
| 1     | 4.41 | 33 | 0.00 | 1     | 2.86 | 27 | n.c  |
| 2     | 2.44 | 34 | 5.24 | 2     | 5.57 | 28 | 3.15 |
| 3     | n.c  | 35 | 5.22 | 3     | 0.00 | 29 | 2.16 |
| 4     | 3.46 | 36 | 0.00 | 4     | 0.00 | 30 | n.c  |
| 5     | 5.25 | 37 | n.c  | 5     | 0.00 | 31 | 4.44 |
| 6     | 5.25 | 38 | GND  | 6     | 0.00 | 32 | n.c  |
| 7     | 0.97 | 39 | 0.15 | 7     | 8.87 | 33 | 3.01 |
| 8     | 5.25 | 40 | 4.17 | 8     | 3.29 | 34 | 2.58 |
| 9     | n.c  | 41 | 0.00 | 9     | 3.29 | 35 | 3.43 |
| 10    | 5.25 | 42 | 0.00 | 10    | 3.34 | 36 | 3.43 |
| 11    | 0.14 | 43 | 0.00 | 11    | 4.27 | 37 | 8.87 |
| 12    | GND  | 44 | 0.00 | 12    | GND  | 38 | 3.47 |
| 13    | 2.63 | 45 | 0.15 | 13    | 3.67 | 39 | 4.42 |
| 14    | 0.00 | 46 | 0.00 | 14    | 4.84 | 40 | 2.82 |
| 15    | 0.00 | 47 | 0.06 | 15    | 4.74 | 41 | 4.43 |
| 16    | 0.00 | 48 | n.c  | 16    | 0.36 | 42 | 4.95 |
| 17    | 0.00 | 49 | n.c  | 17    | 3.29 | 43 | 4.39 |
| 18    | 0.44 | 50 | 0.07 | 18    | 4.92 | 44 | GND  |
| 19    | 0.00 | 51 | 5.25 | 19    | 2.72 | 45 | 0.39 |
| 20    | 0.00 | 52 | 0.04 | 20    | 2.72 | 46 | 6.12 |
| 21    | 0.00 | 53 | 0.04 | 21    | GND  | 47 | 4.06 |
| 22    | 5.26 | 54 | **   | 22    | 6.96 | 48 | 2.17 |
| 23    | 0.00 | 55 | 4.12 | 23    | 5.24 | 49 | 5.26 |
| 24    | n.c  | 56 | n.c  | 24    | 4.03 | 50 | 0.88 |
| 25    | 1.19 | 57 | 4.46 | 25    | n.c  | 51 | 6.28 |
| 26    | 1.80 | 58 | 0.00 | 26    | 5.89 | 52 | 4.12 |
| 27    | GND  | 59 | 4.84 |       |      |    |      |
| 28    | 0.00 | 60 | 4.86 |       |      |    |      |
| 29    | 5.22 | 61 | 5.25 |       |      |    |      |
| 30    | 4.94 | 62 | 2.45 |       |      |    |      |
| 31    | 5.19 | 63 | 2.36 |       |      |    |      |
| 32    | 0.00 | 64 | GND  |       |      |    |      |

| IC002 |      |    |       | IC451 |       |    |       |
|-------|------|----|-------|-------|-------|----|-------|
| 1     | GND  | 1  | 0.00  | 1     | 0.00  | 1  | 0.00  |
| 2     | GND  | 2  | 4.72  | 2     | 4.72  | 2  | 4.72  |
| 3     | GND  | 3  | 4.07  | 3     | 4.07  | 3  | 4.07  |
| 4     | GND  | 4  | 4.12  | 4     | 4.12  | 4  | 4.12  |
| 5     | 4.85 | 5  | 0.00  | 5     | 0.00  | 5  | 0.00  |
| 6     | 4.85 | 6  | 4.07  | 6     | 4.07  | 6  | 4.07  |
| 7     | GND  | 7  | 3.75  | 7     | 3.75  | 7  | 3.75  |
| 8     | 5.26 | 8  | 26.80 | 8     | 26.80 | 8  | 26.80 |
| 9     | GND  | 9  | 2.64  | 9     | 2.64  | 9  | 2.64  |
| 10    | GND  | 10 | n.c   | 10    | n.c   | 10 | n.c   |
| 11    | GND  | 11 | GND   | 11    | GND   | 11 | GND   |
| 12    | GND  | 12 | GND   | 12    | GND   | 12 | GND   |
| 13    | GND  | 13 | 27.60 | 13    | 27.60 | 13 | 27.60 |

| IC551 |       |   |       | IC552 |      |   |      |
|-------|-------|---|-------|-------|------|---|------|
| 1     | 14.05 | 1 | 14.05 | 1     | 8.34 | 1 | 8.34 |
| 2     | GND   | 2 | GND   | 2     | GND  | 2 | GND  |
| 3     | 8.90  | 3 | 8.90  | 3     | 4.97 | 3 | 4.97 |

| IC552 |       |   |       | IC801 |       |   |       |
|-------|-------|---|-------|-------|-------|---|-------|
| 1     | 8.34  | 1 | 8.34  | 1     | 0.58  | 1 | 0.58  |
| 2     | GND   | 2 | GND   | 2     | 0.00  | 2 | 0.00  |
| 3     | 4.97  | 3 | 4.97  | 3     | 0.00  | 3 | 0.00  |
| 4     | 13.18 | 4 | 13.18 | 4     | 13.18 | 4 | 13.18 |

| IC801 |       |   |       | IC803 |        |   |        |
|-------|-------|---|-------|-------|--------|---|--------|
| 1     | 0.58  | 1 | 0.58  | 1     | 88.00  | 1 | 88.00  |
| 2     | 0.00  | 2 | 0.00  | 2     | 130.10 | 2 | 130.10 |
| 3     | 0.00  | 3 | 0.00  | 3     | 300.60 | 3 | 300.60 |
| 4     | 13.18 | 4 | 13.18 | 4     | 130.00 | 4 | 130.00 |

| IC2301 |      |    |      | IC2302 |       |    |       |
|--------|------|----|------|--------|-------|----|-------|
| 1      | 4.38 | 12 | 0.10 | 1      | 6.15  | 12 | 6.15  |
| 2      | GND  | 13 | 5.05 | 2      | 6.80  | 13 | 6.80  |
| 3      | 4.43 | 14 | 4.45 | 3      | 0.21  | 14 | 0.21  |
| 4      | 4.40 | 15 | 4.39 | 4      | 6.19  | 15 | 6.19  |
| 5      | 4.42 | 16 | 4.36 | 5      | 6.80  | 16 | 6.80  |
| 6      | 4.38 | 17 | 4.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 4.47 | 18 | 4.39 | 7      | 11.16 | 18 | 11.16 |
| 8      | 5.47 | 19 | 4.41 | 8      | 11.36 | 19 | 11.36 |
| 9      | 4.40 | 20 | 4.43 | 9      | 0.00  | 20 | 0.00  |
| 10     | 1.43 | 21 | 8.86 | 10     | 24.10 | 21 | 24.10 |
| 11     | 5.26 | 22 | 0.43 | 11     | 11.19 | 22 | 11.19 |
| 12     | GND  | 23 | 0.96 | 12     | 10.90 | 23 | 10.90 |

| IC2302 |       |    |       | IC2303 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2303 |       |    |       | IC2304 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2304 |       |    |       | IC2305 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2305 |       |    |       | IC2306 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2306 |       |    |       | IC2307 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2307 |       |    |       | IC2308 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

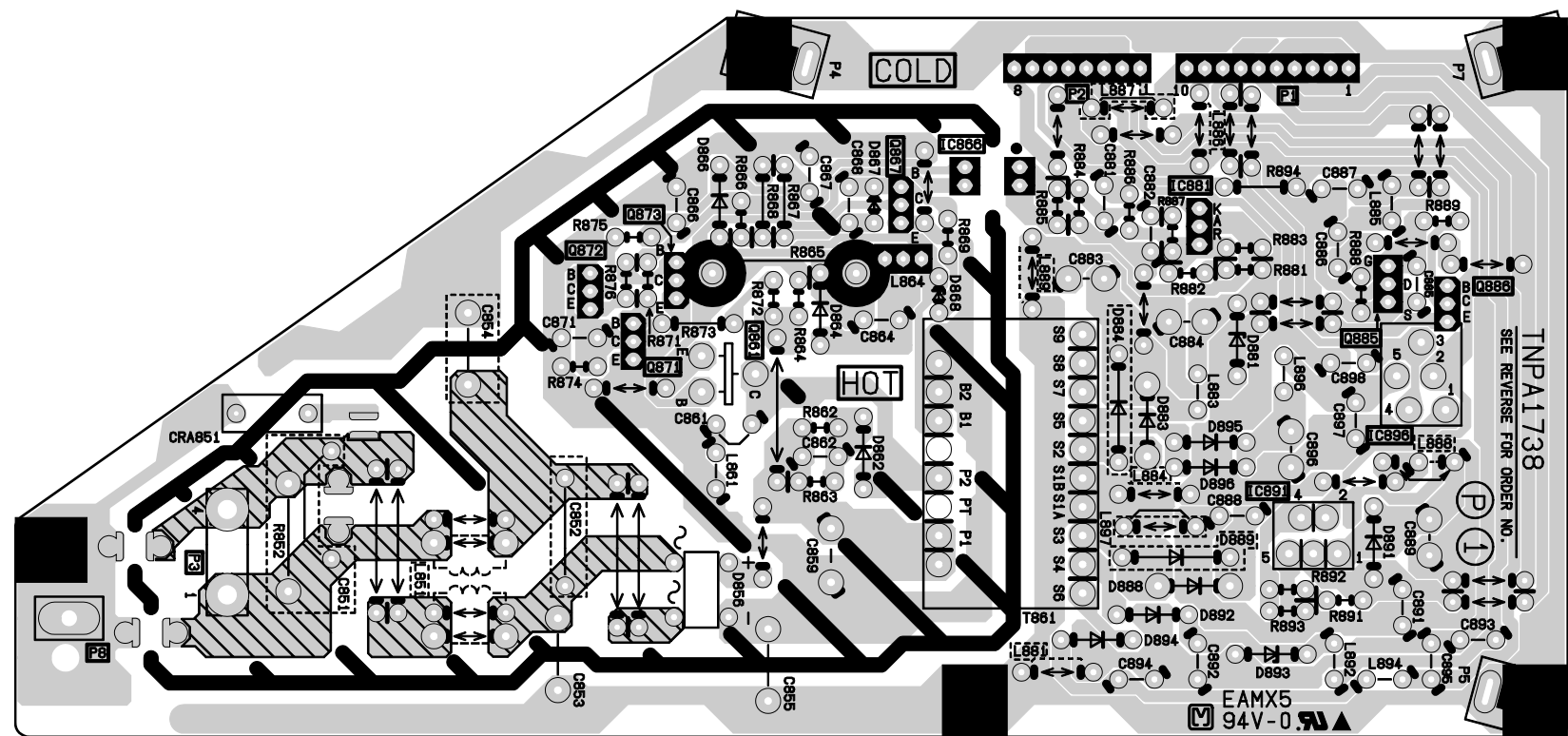
| IC2308 |       |    |       | IC2309 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2309 |       |    |       | IC2310 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2310 |       |    |       | IC2311 |       |    |       |
|--------|-------|----|-------|--------|-------|----|-------|
| 1      | 6.15  | 12 | 6.15  | 1      | 6.15  | 12 | 6.15  |
| 2      | 6.80  | 13 | 6.80  | 2      | 6.80  | 13 | 6.80  |
| 3      | 0.21  | 14 | 0.21  | 3      | 0.21  | 14 | 0.21  |
| 4      | 6.19  | 15 | 6.19  | 4      | 6.19  | 15 | 6.19  |
| 5      | 6.80  | 16 | 6.80  | 5      | 6.80  | 16 | 6.80  |
| 6      | 18.39 | 17 | 18.39 | 6      | 18.39 | 17 | 18.39 |
| 7      | 11.16 | 18 | 11.16 | 7      | 11.16 | 18 | 11.16 |
| 8      | 11.36 | 19 | 11.36 | 8      | 11.36 | 19 | 11.36 |
| 9      | 0.00  | 20 | 0.00  | 9      | 0.00  | 20 | 0.00  |
| 10     | 24.10 | 21 | 24.10 | 10     | 24.10 | 21 | 24.10 |
| 11     | 11.19 | 22 | 11.19 | 11     | 11.19 | 22 | 11.19 |
| 12     | 10.90 | 23 | 10.90 | 12     | 10.90 | 23 | 10.90 |

| IC2311 |      |    |      | IC2312 |      |    |      |
|--------|------|----|------|--------|------|----|------|
| 1      | 6.15 | 12 | 6.15 | 1      | 6.15 | 12 | 6.15 |
| 2      | 6.80 | 13 | 6.80 | 2      | 6.80 | 13 | 6.80 |
| 3      | 0.21 | 14 | 0.21 | 3      | 0.21 | 14 | 0.21 |

P-Board Layout  
TNPA1738

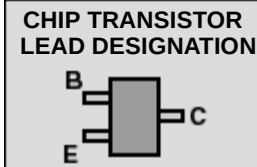


Notes:

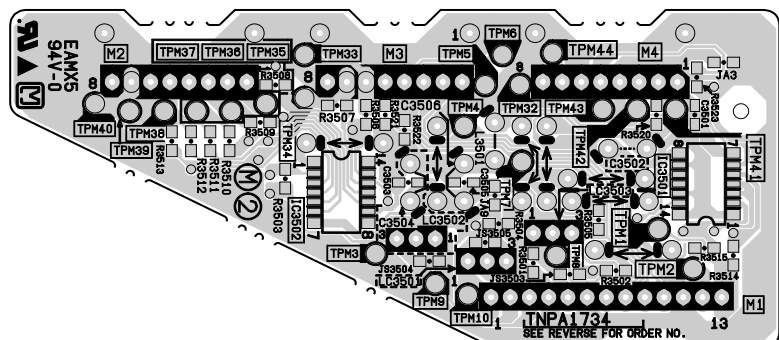
The above boards have been modified to enhance and display traces otherwise hidden by a mask.

Check Parts List for most recent component values and part numbers.

Obtain voltages with a digital multimeter.



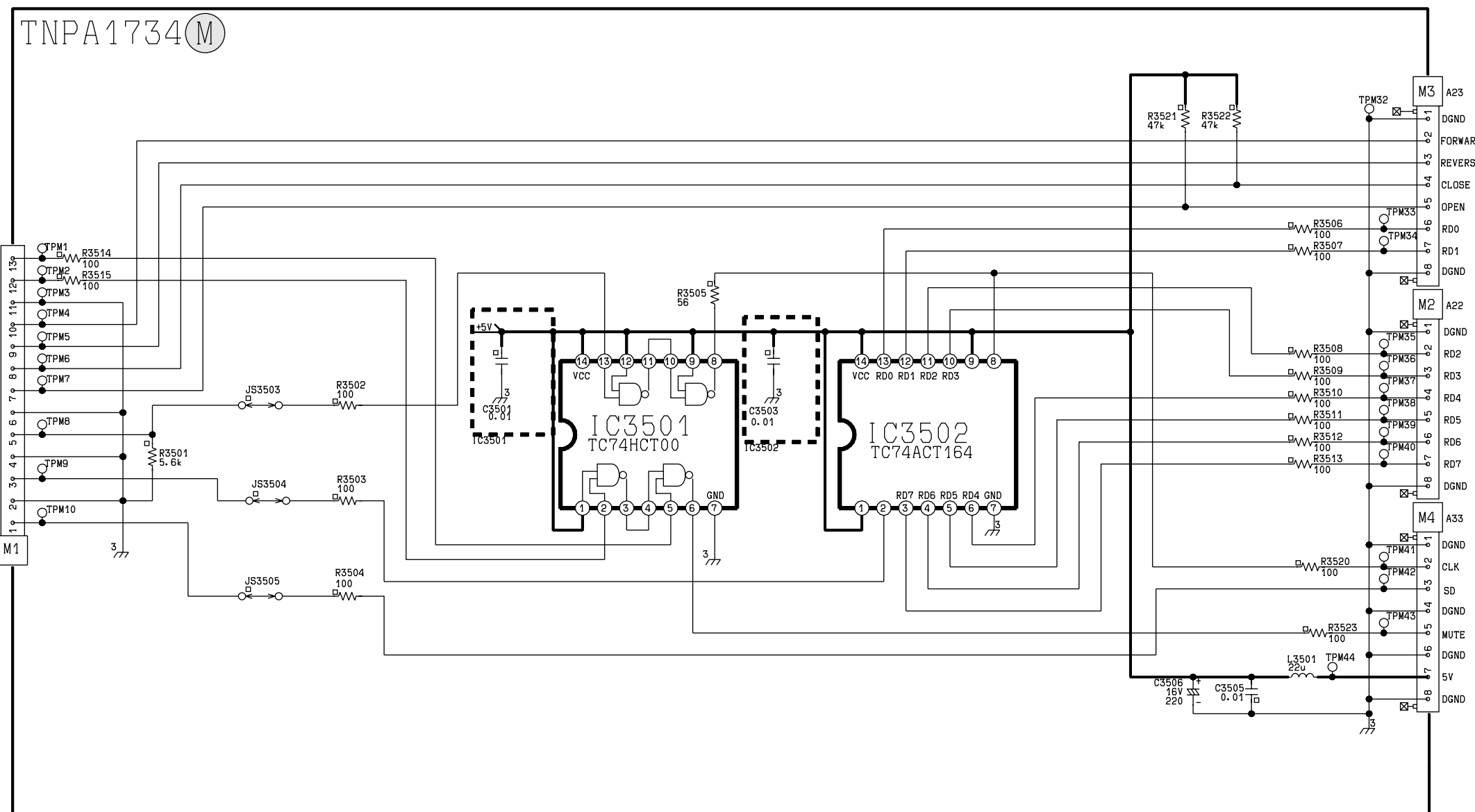
M-Board Layout  
TNPA1734



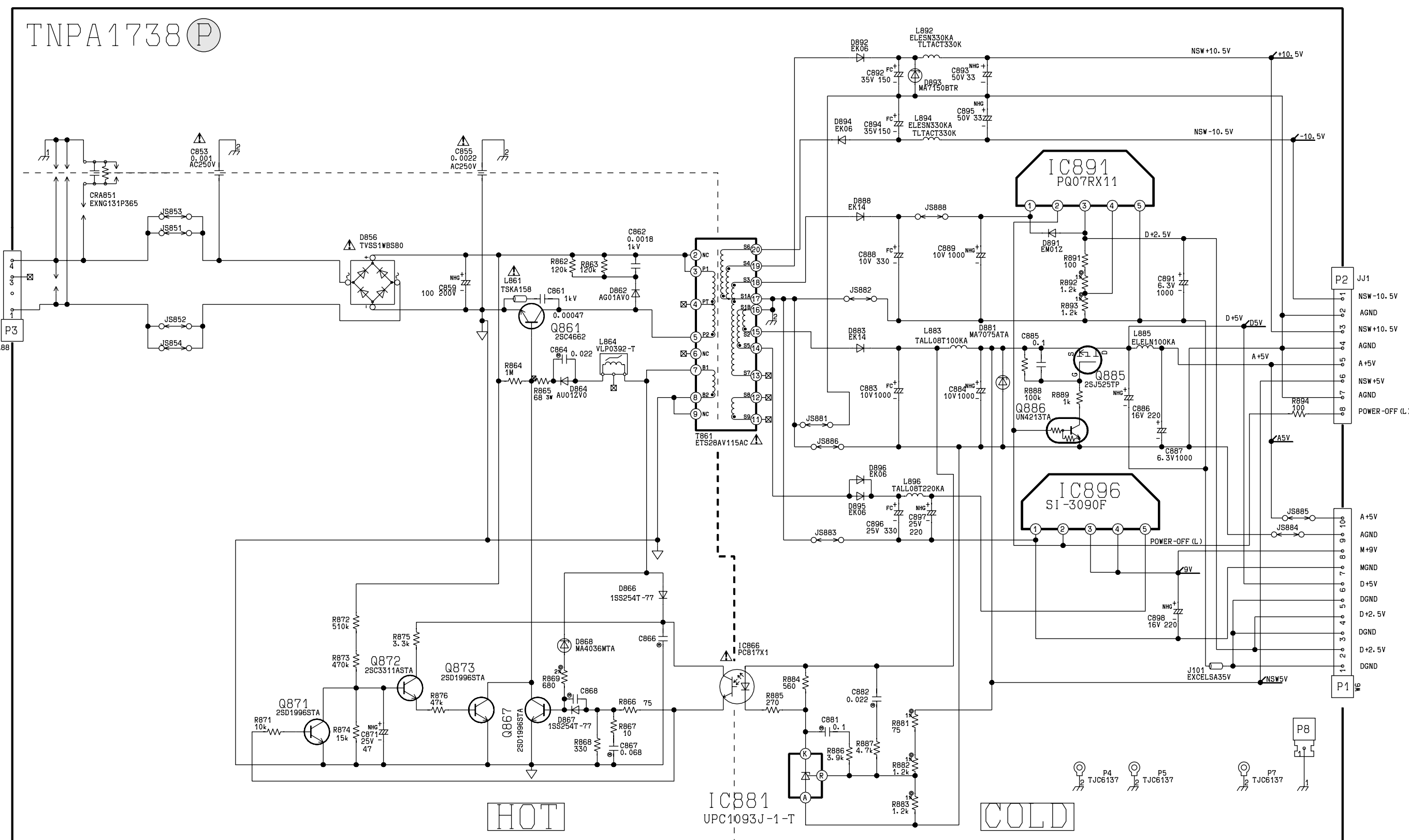
M-Board Voltages

| IC3502            | IC3501            |
|-------------------|-------------------|
| 1 . . . . . 4.96  | 1 . . . . . 4.96  |
| 2 . . . . . 2.47  | 2 . . . . . 3.27  |
| 3 . . . . . 1.00  | 3 . . . . . 0.00  |
| 4 . . . . . 2.00  | 4 . . . . . 0.00  |
| 5 . . . . . 0.74  | 5 . . . . . 0.22  |
| 6 . . . . . 0.85  | 6 . . . . . 4.95  |
| 7 . . . . . GND   | 7 . . . . . GND   |
| 8 . . . . . 4.17  | 8 . . . . . 4.17  |
| 9 . . . . . 4.95  | 9 . . . . . 4.96  |
| 10 . . . . . 0.87 | 10 . . . . . 0.79 |
| 11 . . . . . 1.82 | 11 . . . . . 0.79 |
| 12 . . . . . 0.93 | 12 . . . . . 4.96 |
| 13 . . . . . 2.07 | 13 . . . . . 2.69 |
| 14 . . . . . 4.95 | 14 . . . . . 4.95 |

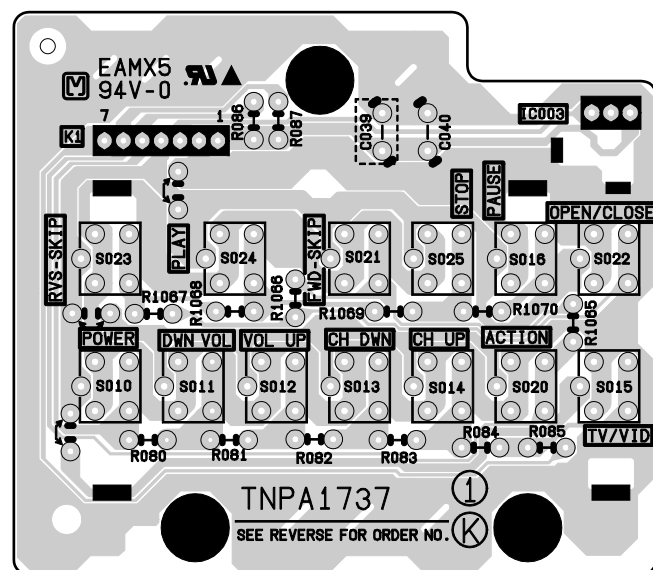
M-Board Schematic



P-Board Schematic



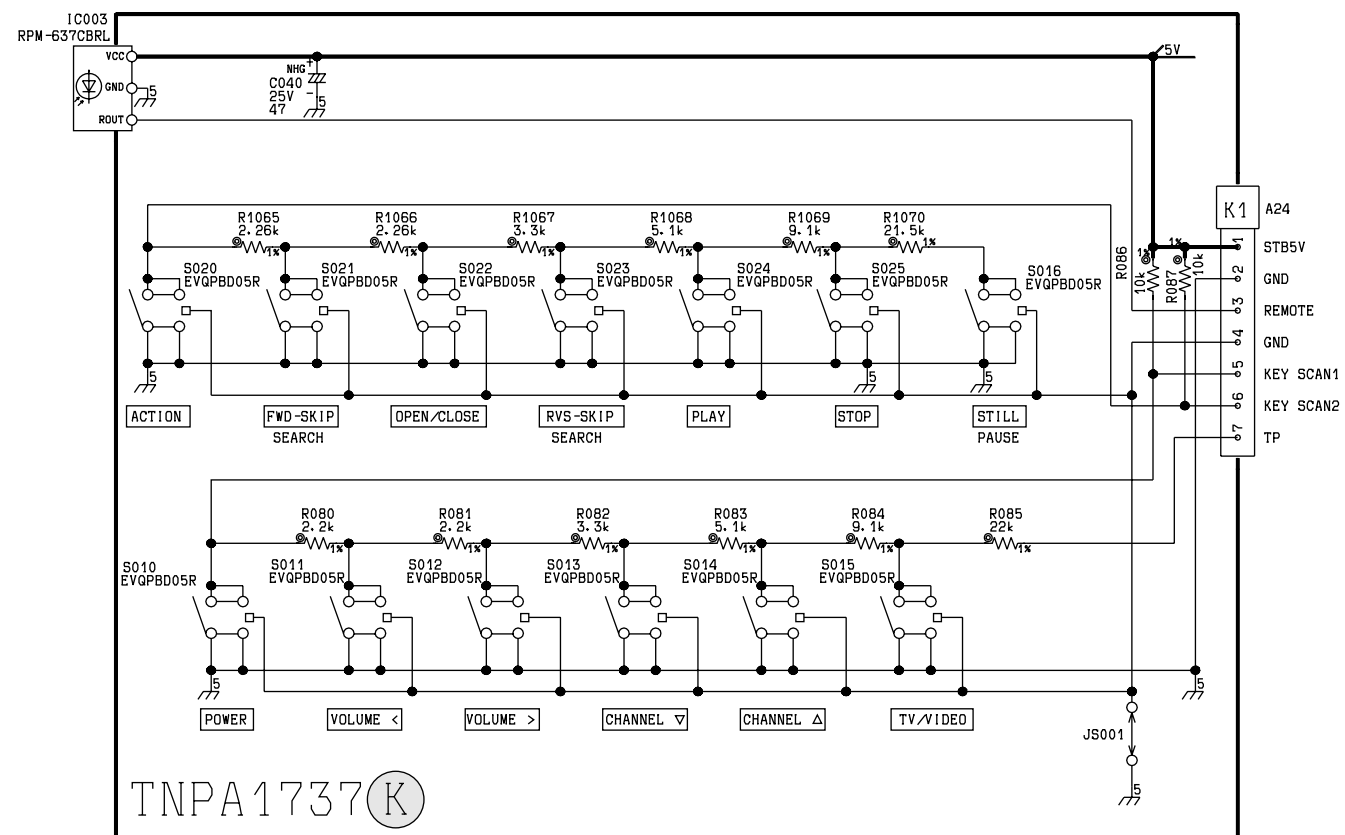
K-Board Layout  
TNPA1737



Boards Designation

- A-Board - Main Chassis
- C-Board - CRT Drive
- G-Board - Front Video Input
- JJ-Board - A/V Amp Interface
- K-Board - Customer Controls
- M-Board - DVD-TV CPU Interface
- P-Board - DVD Power Supply
- W-Board - DVD Unit Interface

K-Board Schematic



Waveform Measurements

- Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
- Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
- Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
- All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
- Ground symbol  $\downarrow$  shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

P-Board Voltages

| IC866              | IC881            | IC891            | IC896            |
|--------------------|------------------|------------------|------------------|
| 1 . . . . . 5.16   | A . . . . . GND  | 1 . . . . . 4.00 | 1 . . . . . GND  |
| 2 . . . . . 4.03   | R . . . . . 2.49 | 2 . . . . . 0.00 | 2 . . . . . 0.00 |
| 3+ . . . . . 58.00 | K . . . . . 2.84 | 3 . . . . . 0.00 | 3 . . . . . 0.00 |
| 4+ . . . . . 64.00 |                  | 4 . . . . . 0.00 | 4 . . . . . 0.00 |
|                    |                  | 5 . . . . . GND  | 5 . . . . . 9.41 |

|   | Q861+  | Q867+ | Q871+ |
|---|--------|-------|-------|
| B | 0.00   | .50   | .62   |
| C | 136.00 | 0.00  | 0.00  |
| E | GND    | GND   | GND   |
|   | Q872+  | Q873+ | Q886  |
| B | 0.00   | 0.00  | 0.00  |
| C | 7.26   | 0.00  | 5.10  |
| E | 0.00   | GND   | GND   |
|   | Q885   |       |       |
| G | 5.11   |       |       |
| S | 0.71   |       |       |
|   | 5.16   |       |       |

Voltage Measurements

- Voltage measurement:
  - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
  - All Picture and Audio adjustments are set to Normalize.
  - TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
  - Volume - Min.
  - TV/Video SW - TV position
  - Audio Mode - Stereo
- Voltage readings are nominal and may vary  $\pm 10\%$  on active devices. Some voltage reading will vary with signal strength and picture content.
- Supply voltages are nominal.
- Ground symbol  $\downarrow$  indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

Schematic Notes

- Resistors are carbon 1/4W unless noted otherwise.
- Capacitors are ceramic 50V unless noted otherwise.
- Coil value notes is inductance in  $\mu$ H.
- Test point indicated by  $\uparrow$ : Test point but no pin  $\downarrow$ .
- Components indicated with  $\Delta$  are critical parts and replacement should be made with manufacture specified replacement parts only.
- (BOLD LINE) indicates the route of B+ supply.
- The schematic diagrams are current at the time of printing and are subject to change without notice.
- Ground symbol  $\downarrow$  indicates HOT GROUND CONNECTION.  $\downarrow$  indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

A

B

C

D

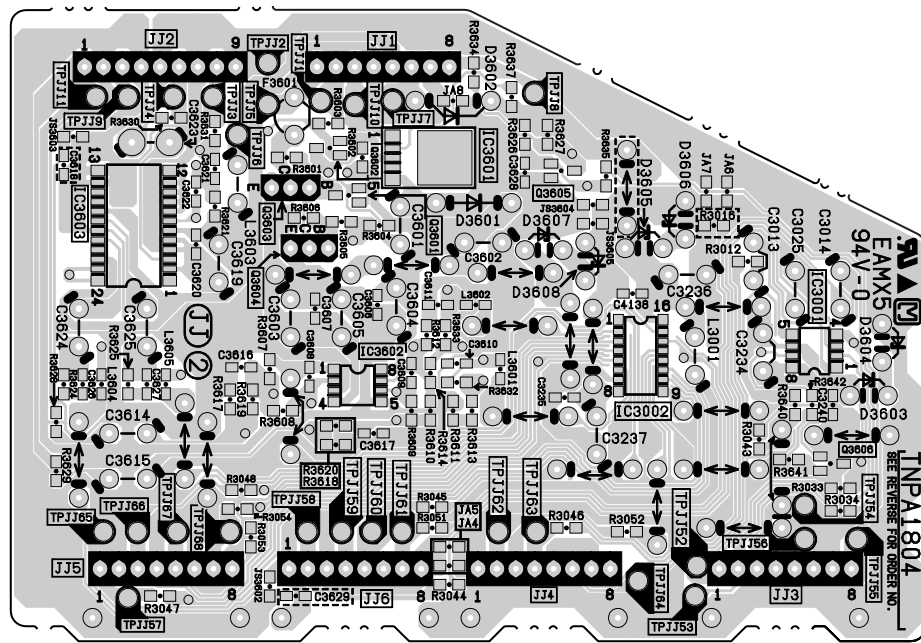
E

F

G

H

### JJ-Board Layout TNPA1804

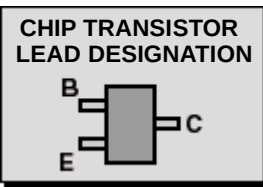


### JJ-Board Voltages

| IC3603 |       |      |  | IC3001 |       |      |  | IC3002 |       |      |  | IC3601 |       |       |  | IC3602 |       |       |  |
|--------|-------|------|--|--------|-------|------|--|--------|-------|------|--|--------|-------|-------|--|--------|-------|-------|--|
| 1      | ..... | n.c  |  | 13     | ..... | GND  |  | 1      | ..... | 0.00 |  | 1      | ..... | 10.85 |  | 1      | ..... | 0.00  |  |
| 2      | ..... | 0.50 |  | 14     | ..... | GND  |  | 2      | ..... | 0.00 |  | 2      | ..... | GND   |  | 2      | ..... | 0.00  |  |
| 3      | ..... | 0.99 |  | 15     | ..... | n.c  |  | 3      | ..... | 4.00 |  | 3      | ..... | 8.98  |  | 3      | ..... | GND   |  |
| 4      | ..... | GND  |  | 16     | ..... | n.c  |  | 4      | ..... | 0.00 |  | 4      | ..... | 0.00  |  | 4      | ..... | 8.89  |  |
| 5      | ..... | GND  |  | 17     | ..... | 4.91 |  | 5      | ..... | 4.00 |  | 5      | ..... | 2.20  |  | 5      | ..... | GND   |  |
| 6      | ..... | 4.91 |  | 18     | ..... | 0.93 |  | 6      | ..... | 8.87 |  | 6      | ..... | 0.00  |  | 6      | ..... | 0.00  |  |
| 7      | ..... | 0.70 |  | 19     | ..... | GND  |  | 7      | ..... | 4.24 |  | 7      | ..... | 9.00  |  | 7      | ..... | 0.00  |  |
| 8      | ..... | GND  |  | 20     | ..... | 1.50 |  | 8      | ..... | GND  |  | 8      | ..... | 5.25  |  | 8      | ..... | 8.98  |  |
| 9      | ..... | GND  |  | 21     | ..... | n.c  |  | 9      | ..... | 2.25 |  | 9      | ..... | 0.00  |  | 9      | ..... | 0.00  |  |
| 10     | ..... | GND  |  | 22     | ..... | 4.91 |  | 10     | ..... | 2.51 |  | 10     | ..... | 4.23  |  | 10     | ..... | 0.00  |  |
| 11     | ..... | GND  |  | 23     | ..... | 0.00 |  | 11     | ..... | 4.23 |  | 11     | ..... | 0.00  |  | 11     | ..... | -0.12 |  |
| 12     | ..... | GND  |  | 24     | ..... | 0.00 |  | 12     | ..... | 0.00 |  | 12     | ..... | 8.86  |  | 12     | ..... | 0.00  |  |

| Q3601 |       |      |  | Q3602 |       |      |  | Q3603 |       |        |  | Q3604 |       |      |  |
|-------|-------|------|--|-------|-------|------|--|-------|-------|--------|--|-------|-------|------|--|
| 1     | ..... | 8.71 |  | 1     | ..... | 8.34 |  | 1     | ..... | -9.43  |  | 1     | ..... | 0.65 |  |
| 2     | ..... | 9.43 |  | 2     | ..... | 8.93 |  | 2     | ..... | -10.97 |  | 2     | ..... | 9.43 |  |
| 3     | ..... | 9.44 |  | 3     | ..... | 8.98 |  | 3     | ..... | -8.88  |  | 3     | ..... | 0.00 |  |

| Q3605 |       |      |  |
|-------|-------|------|--|
| 1     | ..... | 0.28 |  |
| 2     | ..... | 2.80 |  |
| 3     | ..... | GND  |  |



### Boards Designation

- A-Board - Main Chassis
- C-Board - CRT Drive
- G-Board - Front Video Input
- JJ-Board - A/V Amp Interface
- K-Board - Customer Controls
- M-Board - DVD-TV CPU Interface
- P-Board - DVD Power Supply
- W-Board - DVD Unit Interface

#### Notes:

The above boards have been modified to enhance and display traces otherwise hidden by a mask.

Check Parts List for most recent component values and part numbers.

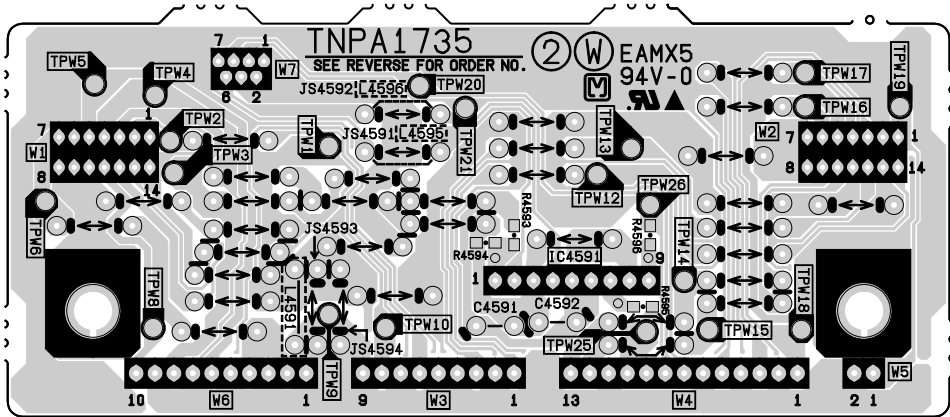
Obtain voltages with a digital multimeter.

#### Waveform Measurements

- Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point).
- Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 9 bars of EIA colors, 100 IRE white and 7.5 IRE black).
- Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to 'MIN'.
- All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
- Ground symbol  $\downarrow$  shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

### W-Board Layout TNPA1735



#### Voltage Measurements

- Voltage measurement:
  - AC input to the Receiver is 120V, NTSC (HD, 1125 & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black).
  - All Picture and Audio adjustments are set to Normalize.
  - TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
  - Volume - Min.
  - TV/Video SW - TV position
  - Audio Mode - Stereo
- Voltage readings are nominal and may vary  $\pm 10\%$  on active devices. Some voltage reading will vary with signal strength and picture content.
- Supply voltages are nominal.
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CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

#### Schematic Notes

- Resistors are carbon 1/4W unless noted otherwise.
- Capacitors are ceramic 50V unless noted otherwise.
- Coil value notes is inductance in  $\mu$ H.
- Test point indicated by  $\uparrow$ , Test point but no pin.
- Components indicated with  $\Delta$  are critical parts and replacement should be made with manufacture specified replacement parts only.
- (BOLD LINE) indicates the route of B+ supply.
- The schematic diagrams are current at the time of printing and are subject to change without notice.
- Ground symbol  $\downarrow$  indicates HOT GROUND CONNECTION;  $\downarrow$  indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

### W-Board Schematic

